The Builder.

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Ventilation of Dwelling-houses.

IN referring a few weeks ago to the resolution passed by the Journeyman Tailors' Union that all tailors' workshops should be supplied with an adequate amount of fresh air for each person, by means of "modern ventilating appliances," we observed that the Union, though perfectly right in principle, were asking for a luxury which is to be found in very few even of the most costly and well-appointed residences of the wealthier classes in this country. Dwelling-houses of the largest class are still habitually built with no special system of ventilation, save in a few exceptional cases; and as to the smaller and ordinary middle-class town or country houses built on speculation, any idea of a special system of ventilation would be regarded by their builders, if it were ever thought of at all, as commercially out of the question, involving an expenditure out of proportion to the return that could be expected in rent: and until the tenants of this class of houses attach so much importance to an efficient ventilating system as to be willing to pay a higher rent for a ventilated house, it is only reasonable that the speculating builder should take such a view. But as a rule the tenants or purchasers of houses in this country are sublimely indifferent on the subject; and even in the case of houses built specially for a private owner under the supervision of an architect, it is very rarely that the client makes any demand on his architect for the provision of a system of ventilation.

It is not to be pretended that the problem of ventilating ordinary dwellings is in any sense on the same footing as that of public buildings. A theatre, church, or any other kind of meeting-room is under quite different conditions from a dwelling-house. In a public room a number of persons are packed together far more closely than in a dwelling-house, in proportion to the cubical contents of the building; the individuals composing the crowd cannot in general change their situation at pleasure, but must put up with such air as is meted out to them where they sit. The occupation of the building is only for a limited portion of the twenty-four hours. The building consists mainly of one large chamber, much easier to deal with collectively than the numerous small apartments of a dwelling-house; and while the crowded state of the building renders mechanical means of ventilation an absolute necessity in order to secure a satisfactory result, the necessary expenditure for this can generally be arranged for in such cases, as a portion of the working expenses of the building, without extravagance; and in large blocks of offices, especially such as are under State control for official purposes, a central ventilating power of some kind, either mechanical or in the shape of an exhaust chimney, can generally be applied economically to change the air of the whole building, all the apartments in which are mostly in use at the same time and for the same number of hours.

How different is the whole case in a dwelling-house. Here we have a building which is inhabited the whole of the twenty-four hours, divided into small apartments which are in use at various times, the bedrooms being empty, except at short intervals, while the sitting-rooms are in use; and the sitting-rooms entirely empty at night, while the bedrooms are in continuous occupation. In the average middle-class house the expense of a continuously-active mechanical means of ventilation, or even of an exhaust shaft in continuous working night and day, would be prohibitive. But even in large mansions where the owner could afford to keep up such a system, it would be necessary, unless there were to be a great waste of power, to have elaborate arrangements for cutting off the ventilating action from rooms not in use, concentrating it at night on the bedrooms, and by day on the other portions of the house, which complicates the problem very much, and renders a central system by no means so obviously applicable to even the largest class of dwelling-house as to a public building.

A central system has however in all cases one obvious advantage, that by admitting the whole of the air for ventilation by one main inlet, for distribution thence, the temperature of the air of the whole house can be regulated in the simplest manner and at the least cost. It is this fact especially which seems to have fascinated Drs. Drysdale and Hayward, who now publish, under the somewhat high-sounding title of "Health and Comfort in Housebuilding," a third edition, with considerable additions, of the work* in which they recommend the system on which they have ventilated their own houses. The authors in their preface to the third edition express a mild and dignified surprise that a new edition should be called for, inasmuch as in a certain "Dictionary of Engineering," 1874, their system was described as "a truly scientific and rational one," with other expressions of approval; and after such an opinion they had hoped "there would have been no further need of a work like this, but that the practical points would have been incorporated by this time into the ordinary literature of architects, sanitarians, and engineers." This is a good deal to expect as a result from the commendation of a single not very widely-known publication (which we observe is issued by the same firm who publish the work thus commended); but the authors write in the true spirit of doctrinaires, who have formed a system theoretically satisfactory to themselves, and cannot understand how its perfectly satisfactory character should not be equally apparent to every one else. Finding however that their principles have not yet been generally admitted or put into practice, and that "we have even in new houses the same patchwork ventilation of single rooms with cold air, against which our book was directed, a new edition is therefore called for." This is a somewhat lofty position to assume, and we decidedly contest the right of the authors to pose as the only infallible guides to house ventilation. They have the credit however, of having contrived a general system of ventilation for dwelling houses by a central exhaust and a central inlet, with very trifling expense in the working, though not without considerable expense in the first installation; and considering the usual neglect of ventilation, already noted, in building dwelling-houses, every reasonable effort to bring about an improvement in this respect should have due attention.

The authors' system, which has been noticed in former years in our columns, is, we may remind the reader, that the external air should be admitted into a chamber warmed (except in hot weather) to whatever temperature is thought desirable; admitted thence into a central lobby

* "Health and Comfort in Housebuilding; or, Ventilation with Warm Air by Self-Acting Suction Power," &c. By J. Drysdale, M.D., and J. W. Hayward, M.D. Third edition. London: E. & F. N. Spon; 1890.

which is kept from immediate communication with the outer air, and warms the fresh air reservoir for the house; and thence passed through openings near the ceiling into the several rooms. From the rooms it is led by tubes to a collecting foul air chamber at the top of the house, from which it is drawn by a down-cast suction pipe, delivering into an up-cast flue surrounding the kitchen flue, the heat of which forms the extracting power. The chimney flue for this purpose is required to be in the centre of the house, the actual chimney being a circular metal pipe, which takes the smoke and heat from the kitchen fire, while the space around this, and warmed by it, constitutes the upcast extract shaft, "which must be so tall as to reach several feet higher than any other chimney of the house, in order to provide a long syphon for the purpose of increasing the suction from the foul-air chamber, by abstraction of the heat of the smoke." The idea, it will be seen, is that the kitchen fire, being always in use in the daytime, is an exceedingly economical exhaust power, the only loss being the waste heat which would in any case go up the kitchen flue. But the authors claim that in addition to this, the syphon form of the down and upcast flues, with the latter forming the longer leg, produces a draw even when the kitchen fire is not in use. We give this in their own words:—

"This is not a matter of theory only, but has been proved by direct observation in house No. 2, in the foul-air chamber of which strips of silk are hung over all the inlets, in order to indicate the current. These have been observed to be always blown in the right direction, even during the summer when the kitchen fire was not in use, and though all the windows are, for the sake of keeping out the cold air the blacks and the dust, made fast and not to be opened. . . . . In fact the whole system becomes then another form of the Watson ventilator, with the inlets distributed throughout the whole house."

"House No. 2" means the second of the two houses of which plans and sections are given as illustrations, and which we shall probably not be wrong in concluding are the houses built or arranged by the two authors for themselves. The remark as to the windows all being kept tightly closed brings forward another feature of the scheme, one object of which, we are told, is to prevent air entering the house by any other entrance than the one main inlet specially provided. The object of this is to ensure that no air should enter the house in cold weather except such as has been artificially warmed. The authors are particular in pointing out that they do not propose to warm the house by hot air, or to dispense with fireplaces or other means of warmth in winter, but only to warm it up to what they consider a healthy standard, and to avoid draughts of cold air. If we remember right, this system of shutting up the windows completely was made one of the strongest points by Dr. Hayward in originally propounding his scheme; but there seems to be a degree of doubtfulness about it now. At all events mention is made of a house in which the authors' plan was carried out as a warm-air heating scheme as well as for ventilation; "fireplaces were rejected, the windows closed hermetically, and the entire warming was effected by means of hot air" It is not surprising to learn that "within a year or two, fireplaces were introduced, and the windows made to open." We should think so. Anything more stuffy and unhealthy we can hardly imagine; and this was, it appears, a house built by a medical man for his own abode!

Where the air is merely warmed to what is considered a healthy and normal temperature for breathing, the results need not be so disastrous; but even in this case we should like to ask whether it is seriously maintained that in summer weather, with all windows kept closed, no assistance to ventilation afforded by fires in the rooms, and with the kitchen fire, which is used as the exhaust, not burning, this central siphon ventilator draws into a house all the fresh air that is necessary or desirable for a healthy state of living? We can only say that we are absolutely sceptical on the point, and should be sorry to live in summer, or even spend a day in, a house so constructed.

The non-use of the kitchen fire, however, was an exceptional circumstance. But taking the system in its normal working order, with the kitchen fire burning hotly and creating a good pull on the extract and inlet system, is this a satisfactory or healthy way of arranging a house for living in during summer weather? It is impossible that air admitted through this system of a cellar opening, and then a central lobby, and thence into the rooms, can have the healthy freshness of summer air admitted direct through the open window. The very idea is enough to give one a stifling sensation. We will go further, and ask whether it is even in winter the ideal of a healthy house to close all windows and pump air in through a steam coil in a cellar? The authors are desirous apparently to impose on the public, as the only right thing, the system which pleases and satisfies them. Possibly they are peculiarly constituted; or again possibly they have rendered themselves abnormally sensitive by constantly brooding over effects to keep out the outer air from their houses. Certainly their dread of open windows is something almost amusing: they return to this point again and again; open windows are bad enough in the daytime, but at night, in a bedroom, they seem to be regarded as absolutely poisonous. That is their individual experience, perhaps. We will offer them another individual experience, that of a person whom we will call "X," who has for years been in the habit of having one or more of the windows opening on his staircase (which forms a sort of central lobby from the top to the bottom of the house) open all day in all weathers (except driving rain), and the staircase filled direct with outer air; who habitually and in all seasons comes down to a breakfast-room with windows wide open, and sleeps in a bedroom with a "window-board" to raise the sash and let air in at the meeting rail. The only ill effect that X. and his family have ever experienced from this is the feeling of being half-stifled in the houses of some of their friends, who share our authors' dread of open windows. The learned authors will say perhaps that X. must be a person of unusually robust health. But is not that putting the cart before the horse? Is is not possible that the robust health is exactly due to the habit of living in a free circulation of out-door air, instead of shutting it out by all possible means? In the artificial life of cities our belief is that the more "open-air" people can render their lives, as a rule, the longer and healthier will those lives be. But of course it stands to reason that people who have for half their life time cooped themselves up when in their houses will have become nervously anxious about draughts; they have artificialised their constitutions and require to be treated as greenhouse plants, and that is just what Drs. Drysdale and Hayward are encouraging.

Accepting the fact that there are many invalid and delicate people in the world, the authors' system carried out to its full extent no doubt offers a good expedient for a house for those who are already such; but the adoption of the system in full would, to our thinking, only tend to increase people's susceptibility to cold and to produce a delicate and valetudinarian race of people. Let us therefore dismiss these closed windows, hoping to hear no more of them. Leaving the windows of the house in their ordinary condition, capable of being opened whenever required, there is no doubt much of ingenuity and value in this scheme of the central extract, as of course there are many occasions when the windows of occupied rooms cannot comfortably remain open. But there are objections to its application to a house in the manner described which cannot be overlooked. In the first place, we cannot altogether accept the dictum that the exhaust system, dependent on the heat of the kitchen fire, will act sufficiently during the night when the fire is always low and sometimes out altogether. But it is exactly at night that the admission of slightly-warmed fresh air into the rooms is most valuable. Bedrooms scarcely ever have enough ventilation; they are always close in the morning, as every one knows; simply because there is not that frequent going in and out and consequent movement and replacement of air which occurs in a sitting-room in the daytime. It appears therefore that the Drysdale-Hayward system is rather likely to fail more or less at the very time when it would be of most value. Secondly, it requires a house to be planned for it, which cannot always be conveniently done even in building a new house, and application of the system to existing houses is in most cases, as the authors acknowledge, very difficult. We admit, however, that it is difficult to carry out any efficient system of house ventilation that has not been foreseen and provided for in building the house. Thirdly, the ventilating openings into rooms from one central lobby are likely to seriously militate against privacy. A conversation in ordinary tones must be to some extent overheard in the lobby, or so we should expect. Fourthly, recurring to what we said at the outset as to the different conditions of a dwelling-house from those of a public building, we question whether the principle of a general system of ventilation for the whole house meets the requirements of the case. In a dwelling-house different rooms are used under different conditions. There is no occasion on which the want of proper ventilation in most dwellings is so much felt as at a large dinner party. The dining-room is then under somewhat the same conditions, on a smaller scale, as a public meeting room. It is filled by an abnormal number of persons crowded together in unusual numbers in proportion to the cubic contents of the room. A system of ventilation therefore, which changes the air of the room sufficiently often to supply the needs of its ordinary number of daily occupants, is quite inadequate for a dinner-party. The same objection becomes even stronger in the case of an evening or afternoon "at home," where a drawing-room is often packed with people nearly as close as they can stand. The authors do allude to this, stating that the extract from the drawing-room must be adequate for ventilation when the room is full; but a general ventilating system which would be adequate for this would be excessive for ordinary occasions.

The idea of the central lobby and of the rooms deriving their supply from it appears to us objectionable in a threefold manner; (1) as often interfering with convenience of planning; (2) as being what we should call stuffy in its results; (3) as destructive of privacy. There is another objection to be made as to the mode of inlet proposed, *i.e.*, through the cornices of the rooms. The authors find fault with what is called the Tobin system for projecting fresh air towards the ceiling of the rooms, by which it mixes with the foul air at the top of the room and drags some of the latter down again with it; yet they themselves propose the place of inlet at the top of the room, with just the same objection to it. The exit is to be at the top of the room on the opposite side. In that case one of two things must happen; either the fresh air admitted does not descend at all, but is drawn across the ceiling to the outlet; or if it descends, it does so after mixing with the impure air at the top of the room, having first traversed a warming cellar and a lobby shut out from all connexion with the outer air. And this is called supplying fresh air to a room!

The main idea of utilising the kitchen flue as an economical form of extractor has no doubt its value, but it requires to be got rid of the undesirable elements which the authors have unnecessarily associated with it. There is no need either for the hermetically closed windows or the central lobby with all its numerous inconveniences. If the warming chamber in the basement be adopted, flues should be led from it direct to each room, which is

just as easy as to lead extract flues from each room. They should *not* discharge into the room at the ceiling, but at a height of about five feet from the floor. This is impossible of course with the central lobby system, because that would still more effectually interfere with privacy. The inlets would have to be arranged in a decorative manner, but it is not more difficult to do that on the wall of the room than on the cornice, and we should then be spared also the necessity for the portentously large cornices which are figured in the authors' sections, and which are anything but conducive to architectural refinement of effect. The outlets should all lead from the top of the rooms. Considering that the vitiated air produced from the ordinary occupation of a room rises to the ceiling, this is the natural and commonsense, in fact the scientific method, of arranging it; inlets below, extracts above. Extra inlets should be made for drawing room and dining room to provide for occasions when the rooms are full of people, and all inlets in the various rooms should be capable of being readily opened and closed whenever desired. By this means there need be no extra demands on the extract power when extra ventilation was required for crowded entertaining rooms, as the inlets to the bedrooms and other rooms not in use could be shut off and the current of incoming air directed through the extra inlets in the entertaining rooms instead. Arranged in this manner, there would be no necessity for a special plan of house in order to make the system work, a necessity which is practically an almost fatal obstacle to the employment of the authors' system. Only people who are possessed with a ventilation mania would consent to plan houses in a special and often by no means convenient manner simply for the purpose of adapting them to a scheme of ventilation. Houses are not built for the mere purpose of being ventilated, any more than theatres are built (as some people seem to think nowadays) for the mere purpose of making exits from them; and a system which makes that demand will never come into general use. It is opposed to common sense.

We have still the defect to encounter, that the extract worked by the kitchen flue is weakest at night, or may even cease to act appreciably, and that the system in that case would be a partial failure as to the ventilation of bedrooms at night, which is really more important than that of sitting-rooms by day under the ordinary conditions of everyday life. The adequate ventilation of bedrooms is really the most difficult problem in house ventilation, as it is only in a minority of cases that fires are used, and those must necessarily be left to go out in the course of the night. The separate ventilation of sitting-rooms for everyday occupation is not a difficult matter, because when fires are used, warmed air can be admitted from behind the grate, and the fireplace is itself an extractor; and at times when fires are not wanted the windows (*pace* Dr. Hayward) can be opened. The class of extract ventilators which create an updraught by the impingement of the wind upon them are some of them exceedingly effective when there is wind stirring; but unfortunately they are powerless at the very time when we most require ventilation, when the weather is calm and sultry. Perhaps our authors' system promises more of a result than can be obtained by other means, except costly ones, granting a little extravagance in the manner of making up the kitchen fire for the night. With a house fitted with a complete system of hot-water heating, worked so as to retain its heat through the night, it is easy to induce an incoming current of warmed air through a coil under the window-board, communicating with an external opening. But this is a more expensive installation than can be afforded in many middle-class houses. In such cases we are still of opinion, in spite of the denunciations of the authors against the admission of external air into bedrooms, that the simple device of the raised sash with a deep bottom rail, allowing a vertical inlet for air behind the meeting-rail, is at all events less injurious to the health of the occupants than sleeping with no ventilation at all. Still, if it *can* be kept acting adequately through the night, the authors' system, with the limitations above stated, is the only tolerably inexpensive one which has been proposed for keeping up a change of air in bedrooms at night, without opening the windows; and if it can accomplish that object, that will perhaps prove to be its chief value: but the inlets must not be made at the top of the rooms.

NOTES ON THE NEW EDUCATION CODE.

THE new Code of Regulations as to Elementary Schools came into operation on September 1. It contains some points of special interest to our readers. The first is that Drawing has now been made an obligatory subject for boys in the older schools—that is, for boys who are not in the infants' department. It also has its place as one of the optional subjects in boys' classes throughout a school. This recognition of drawing as a necessary part of elementary education is an important step. It marks the beginning, it cannot be doubted, of a system of technical education in England. It is a very tentative beginning, but it is real one, and it is in accordance with national habits to do things in a piecemeal and unsystematic manner. Our neighbours across the Channel would have produced a beautiful system, which, in the long-run, would very likely have no more important results than our own shy beginning. It will be interesting to observe what results follow from the commencement. But at the present moment the most difficult practical question is the way in which this new subject is to be taught.

In large schools in large towns there are teachers more or less ready; in the rural districts it presents grave difficulties. The ordinary certificated teacher cannot, as a rule, teach drawing. In due time drawing will, no doubt, become one of the subjects in which every teacher can impart information to pupils. It may be doubted, indeed, whether the teaching of drawing under these conditions will be of much value, though it may no doubt give opportunities to boys who have some talent with a pencil to show what they can do, and so obtain a place in the technical schools, which must in time become a part of our educational system. So far as we can see, the best plan for the present, at least in a large number of districts, will be for a certain number of districts to combine and support a common drawing-master. We are by no means sure that this will not ultimately prove to be the best permanent plan, but it seems at any rate to be the only way by which for some time to come districts in rural places, or districts in moderate sized towns, can satisfy the requirements of the new Code.

The second point of importance in regard to the new Code is Schedule VII., which is entitled, "Rules to be observed in planning and setting-up Public Elementary Schools." According to Article 85, these rules apply *primâ facie* to new premises and enlargements only. But as the Education Department must be satisfied that all existing schools are healthy, properly constructed, supplied with suitable offices and accommodation, it would appear that indirectly the schedule is to a large extent binding on existing schools. Take, for example, Article 15 (*b*) of the schedule, which states that "all playgrounds should be properly levelled, drained, enclosed, and fitted with some simple appliances; a portion should be covered, having one side against a wall." If this regulation is obligatory in the case of a new school, why should it not be so in the case of an existing one? We are inclined to think that though the Department may say that such a regulation *must* be complied with in the case of a new school, it will practically enforce it also in the case of an existing school by saying that such a school does not comply with the Article 85, the purport of which we have already given, if this regulation is not followed. It would be impossible to give verbatim the whole of this schedule; if our space permits, we may on a future occasion reprint it for the use of our professional readers. It will be useful, and it may even be amusing. For example, the first article under the heading "Building Rules" is entitled "Planning and Accommodation," and the first section begins by telling us that "In planning a school the first thing is to seat the children in the best manner for being taught." We shall next expect to see in an engineers' manual some such advice as that in planning a dock for ships the first thing is to construct it so that ships may get in and out and be unloaded. It is really too ridiculous that such solemn official truisms should be gravely printed in such an important document as the new Code. Practical information, as that "the proper width for a schoolroom is 18 ft. to 20 ft. (according to length) or 22 ft., is useful, though it appears to be singular, to say the least of it, that the proper width of a schoolroom should be defined, but that no directions are given as to its length. According to the ordinary reading of this regulation, a schoolroom may be as long as you please, but it may not be wider than 22 ft. The schedule contains eighteen headings which refer to structural matters. No. 4 is walls and roofs; No. 5, entrances; and so on. Most of the directions are of an elementary character where they are of a general nature; where they are special, they are more important, because they state details which must be complied with by those builders and architects who are engaged in erecting school buildings. It is a little surprising that such a series of regulations was not before published, and it is probable that its very publication will enable it from time to time to be amended as its practical results are observed and new inventions and improvements are brought into existence.

THE CONVERSION OF TIMBER BY MACHINERY.

BY SAMUEL W. WORSSAM.

IN the conversion of large logs of timber,—hard or soft,—into flitches and boards, the tools generally used are the *circular saw*, the *frame saw*, the *horizontal reciprocating saw*, and the *band saw*. The first-named is in most universal use, by reason of its great producing power and the facility with which it can be manipulated, although at the same time the most costly, alike as to waste of stuff and absorption of horse-power.

Circular Saws.—For a log of 36 in. scantling, a saw of at least 78 in. diameter and 6 easy b.w. gauge is necessary; this means a wide kerf, with a corresponding waste of material. The cost of such a saw is 45*l.*, and the angular velocity 450 revolutions per minute, giving a speed at the periphery of 9,225 ft. per minute. Forty-five horse-power indicated is absorbed in driving a machine carrying so large a plate, and the average rate of cutting is 8 to 10 ft. per minute for hardwood and 18 ft. for soft.

The saw works in a rack bench with travelling table running on rollers for the log, and weighs 9 tons, the cost of the same for logs 36 in. × 40 ft. long when fixed ready for work being 325*l.* It may not be out of place to remark here that, up to the present at least, it has not been found practicable to run saws of greater diameter than 78 in., although larger saws have been made. One was exhibited in 1862 of 87 in. diam., 5 full b.w. gauge, and cost 60*l.*

Occasionally, for logs of greater dimensions than 3 ft., two circular saws are employed, one working above the other on separate spindles, but this arrangement is not recommended owing to the difficulty of getting the saws to run conjointly in a true plane.

Frame Saws.—The second machine in the list,—the frame saw,—has the advantage of the circular when logs have to be sawn into

boards, inasmuch as many and much thinner saws can be used simultaneously; thus, for converting a 36-in. log into 1-in. boards, thirty-four saws are requisite, each of 13 b.w. gauge, whereby there is much less waste of wood as against the circular-saw having 6 slack b.w. gauge. The number of strokes of such a frame carrying thirty-four saws is 120, and the cost of the set, with hook buckles, tillers, and keys, 45*l*. Such a machine weighs 12 tons, and the price for balks, 36 in. by 40 ft. long, fixed ready for working, is 600*l*. The average rate of feed, which is intermittent, for hard wood is 8 in. per minute, for soft 15 in. The blades are keyed in a swing-frame, the tension on each being about 1 ton to every inch of width; a travelling rack or drag carriage running on rollers serves to carry the log.

On a comparison of these two modes of conversion, it is clear that for boards the frame-saw is more economical and productive; as a matter of fact, the circular should only be employed in ripping logs into flitches, which are subsequently re-sawn by the frame into thinner stuff or leaves.

The next reference is to the horizontal saw-frame, which usually carries but one blade. The saw runs at a high speed and cuts inwards and outwards of the stroke, the guides of the swing frame being fixed obliquely in such manner that the saw-teeth clear the cut at each half stroke. This saw, albeit somewhat slow in production, is, owing to its thinness, very saving of stuff, and specially serviceable for opening up costly woods which have to be re-sawn when their character is ascertained. For balks 36 in. by 40 ft. long the weight of the machine is eight tons, and the cost fixed for working, 400*l*. The saw is 6 ft. 6 in. long by 6 in. wide, and 15 b.w. gauge, and makes 190 strokes per minute. The indicated horse-power necessary for a machine of this character is 12 horse-power. In hard wood the average rate of feed, which is continuous, is 2 ft. per minute, in soft 4 ft.

A duplex horizontal saw-frame has lately been patented for operating two saws independently of one another. These are strained in separate swing-frames situated back and front of the main standards, driven from one crank shaft and reciprocated alternately to be in equilibrium.

A vertical single-blade frame is now and then serviceable where limited motive power and ground space only are available; but it is rarely run at high speed on account of risk of vibration, increased production being attained by increase of stroke.

Band Saws.—To advert to the band-saw—the last enumerated—is to trench on debateable ground and fish in troubled waters. This, although one of the most important innovations in the wood-working machine category, has given rise to greater controversy among manufacturers and users than any other. Few of these agree as to its merits and demerits as a means for the conversion of heavy work. In France and the United States its employment is universal, whilst in this country, where it originated, it has hitherto failed in finding favour. There may be many explanations for this; the difficulty with the saw itself, due to inferior quality and consequent breakages, the want of skill in the operative, and the impracticable design of the machine. Our sawyers apparently do not appreciate the fact that a band-saw requires greater care in manipulation than either of the other types mentioned. The French and Americans, on the other hand, have given to it their most careful attention, and with satisfying results.

Unquestionably for heavy work, given a good saw, carefully designed machine, and skilful hands, the band-saw is better adapted than any other, alike for the saving of horse-power and economy of production, apart from the fact that the travel of the saw being continuous it turns out superior work, which requires less subsequent dressing.

The highest quality of saws are manufactured by M. Perin, of Paris, who has made it his task to ensure that they shall withstand the necessary strain and tension they have to bear without fracture. He has likewise introduced simple modes of re-joining or brazing them when this does occur. Means have been devised to reduce the risk of snapping, which frequently arises from the too rapid cooling and contraction of the blade after ceasing to work. Modifications of the saw guides have been effected with a similar object.

In the States, webs of so great a width as 8 in. are in operation, but there is no gain in this; on the contrary, blades not exceeding 4 in. or 5 in. are found superior in not requiring so great tension and correspondingly heavy pulleys, and being liable to less friction in the kerf. The saw must be perfectly parallel in width and thickness, and of uniform temper and set throughout; the form, space, depth, and set of teeth should be carefully studied. The gullet shape of tooth, *i.e.*, teeth with half-round throats, is preferable for soft wood, and the hand-saw for hard.

In practice it is found advisable to have small, loose, adjustable pulleys situated immediately above and below the stuff, and bearing against the inner flat face of the blade to obviate the necessity of straining it to a straight line between the points where it leaves the pulleys, whereby a lesser degree of tension and tautness is necessary. This is an important factor which has not been sufficiently recognised by designers and manufacturers. Any plan lessening the tension of the saw minimises the chance of breakage, and lessens the otherwise requisite strength of the pulleys and standards of the machine.

Referring to the machine itself, this should be substantially and proportionably constructed, with pulleys not less than 6 ft. diam., the upper one being as light as consistent with strength, it having to be driven by the saw from the lower. The rims of the pulleys should be lagged with wood, or covered with leather or india-rubber, to make an elastic cushion for the saw, although the writer has knowledge of a large machine, running for some years, the pulleys of which have no covering whatever; they are turned slightly convex, and the blade runs like a belt on riggers. The pulleys may have flanges, but these should serve only to prevent the attendant when mounting the saw from passing it at the back of them and damaging the finely-sharpened teeth. Should the blade unduly press against these flanges, or any fixed runner or guide, it will immediately buckle and swerve from the true line of cutting. Care must be paid to the design of the tension appliance to provide against the contraction and expansion of the saw whilst working.

With all these points strictly attended to, no reason can be adduced why this class of machine should not be as approvingly received at home as it is at present abroad.

In this country the prevailing type of band-saw machine is the vertical, which for logs 3 ft. by 40 ft. long, costs, when fixed ready for working, 480*l*., and weighs 10 tons. The saw pulleys are each 6 ft. in diameter, and make 300 revolutions per minute, giving a travel to the saw of 5,700 ft. This itself is 42 ft. long, 4 or 5 in. wide, 17 b.w. gauge, and costs 8*l*. to 10*l*.; 20 horse-power ind. is absorbed in operating it, and the rate of feed, which is continuous, in hard-wood is 3 ft. per minute, and in soft 6 ft. The log is advanced to the saw on a table running on rollers.

In France these figures somewhat differ, as there the machines are of less solidity, many of them having the travelling-tables made partly of wood.

For logs 1m00 by 4m00 long, the cost of a machine fixed ready for work in Paris is 9,250 francs. The pulleys are 2m00 in diameter, having the rims coated with buff leather, and making 350 revolutions per minute. The saw is 10 centimètres wide and 14 dixièmes de millimètre gauge. The indicated horse-power absorbed is 20 h.-p., and the rate of feed in hard wood 1m00 per min., in soft 2m00.

For re-sawing flitches 24 in. deep by 6 in. thick, a double band-saw machine is coming into vogue; in this case, the two saws run independently of each other, although the pulleys are on the same standard. To insure uniform travel of the saws, they are worked from one counter shaft only. One blade may be longer or shorter than the other, according to circumstances.

For flitches 24 in. deep and 6 in. thick such a machine costs, when ready for working, 370*l*., and weighs 6 tons. The diameter of each pulley is 4 ft., and makes 250 revolutions per minute, giving each saw a travel of some 4,375 ft. per minute. The initial length of each web is 32 ft., width 2¾ in., and 18 b. w. gauge, and costs 4*l*. The indicated horse-power consumed is 10; rate of speed in hard-wood 4 ft., in soft, 12 ft. The flitch is fed to the saws by adjustable vertical rollers.

Band-saw machines are designed and constructed to operate vertically and horizontally, but the former type is generally selected, and is that here treated of.

There are some other machines used in the conversion of balks, such as those for cutting veneers, &c., but these are omitted for the present, as not coming strictly within the scope of this article. S. W. W.

NOTES.

THE collapse of the Southampton Dock Strike is another piece of evidence that, powerful and effective as have been the labour combinations of the last few years, they are not omnipotent. The fact is that in the existing general contest between capital and labour, there are, as it were, armies engaged on each side in different places in different parts of the world. The victory rests with that army which is best disciplined, organised, and commanded. The analogy to actual warfare may be paralleled in other particulars. The fact, however, which is becoming more and more clear, is that in the future the success of labour combinations over capital is likely to grow less and less. For a long time unions among workmen did little more than raise the rate of wages to a more reasonable standard, and obtain a legitimate recognition for the claims of the artisan. Such unionism was essentially protective of the interests of the labourer. It is now changing its aspect; it is becoming aggressive. It is not so much protective, and is a force attacking capital rather for the purpose of humbling the employer and exalting the labourer, than for protecting the real interest of working men at large. This stage being reached, it is obvious that public sympathy will be with the employers, and also that the latter will combine generally to resist aggressive trades unionism. The very important Shipping Federation is an instance of this tendency. The result must be a series of checks to the trades unionists whenever they have no legitimate ground for their warfare. It is likely also that in this country the labourers will sooner or later be divided into two camps,—those who are unionists, and those who are non-unionists. It takes time for men to see that there can be a tyranny of labour as of any other ruling power; but as soon as this becomes evident, we are much mistaken if many artisans will not prefer to be free to make their own terms with their employers, rather than be under the dominion of paid trades unionist organisers.

A KIND of shudder must have run through all the civilised world at hearing of the burning of part of the Alhambra. We are not of those who think that there can never again be in the world as fine architecture as there has been, but there are some buildings which seem to stand quite apart in their combined artistic and historic interest, and the destruction of which would be a loss to the whole world, which could never be made up for. The Alhambra, like the Taj Mahal, St. Mark's, and the Ducal Palace, is unique. It is to be hoped that double vigilance will be exercised over the safety of the portion happily untouched. The catastrophe reminds one also that we have been told only a few

days ago that the Ducal Palace at Venice is full of combustible material, and exposed to the greatest risk from fire in the case of the slightest accident setting anything alight. The misfortune in these cases is that the people who have the immediate custody of these precious buildings are not those who care most for their preservation. It is the outside world that watches anxiously for the safety of the Ducal Palace, the burning of which would probably be regarded by most of the Venetian official authorities as only an opportunity for erecting "more commodious premises" on the site. And as to the Alhambra, we learn from the *Times* telegram that "At a Cabinet Council held last night it was decided that a Government delegate should go to Granada to estimate the amount of the damage caused by the fire at the Alhambra Palace, and to report upon the possibility of restoring it." The Council might save themselves the trouble of the latter inquiry. They cannot restore it, at all events.

NOW that drawing has been made one of the obligatory subjects in public elementary, schools the question naturally suggests itself—will it be made one of the ordinary elementary subjects in schools for the upper classes? Will the sons of professional men in the small schools, and in the great public schools, be taught drawing as a part of the ordinary school course? The public schools are not quick to change their system, and it must be admitted that in regard to drawing they have hitherto been behind the age. There are already artists enough and to spare, but an elementary knowledge of drawing is really a necessity of ordinary life. Not only for many subjects of study is it useful; it is also required in many details of daily life. Does a householder wish to have a new cupboard in his hall, a sketch of the article which is in his mind will explain his wants to the workman better than half-an-hour of verbal or two pages of written description. But we may put this argument on one side, because how can the private and public schools of England any longer refuse to regard drawing as a necessary part of a boy's education, when sons of artisans and labourers are in future to be taught the use of the pencil, and when drawing has been placed on a par with reading and writing in the elementary educational system?

MR. W. J. LOFTIE recently called attention in the *Times* to the acts of Vandalism which are committed in Egypt. He pointed out that oftentimes portions of ancient monuments are broken up by the natives, in order to avoid the fact becoming known that they are in possession of these articles, such possession rendering them liable to punishment. But the preservation of ancient monuments nearer home is not an easy task, and, considering that the preservation of the lives and property of native Egyptians has only recently, thanks to England and English officials, become an accomplished fact, we must not take it too much to heart if the monuments of ancient Egypt are not yet as safe as we could wish. But even the preservation of monuments in Egypt may be effected by a little English vigour and management, and we would suggest that were Mr. Loftie, and others interested as he is in ancient relics, to make representations to the Egyptian Government, to English officials, and the English Foreign Office something would very soon be done to put this matter on a better footing. But when we abuse the Egyptian officials, and the Egyptian fellah, we must not forget the modern Goth, who, in the guise of an English or American tourist, traverses Egypt seeking some monument to disfigure with his initials, or some relic which he may purchase for his lobby in Kensington or Boston. Strict legislation against the acts of Vandalism committed by tourists is as necessary as better laws for the preservation of Egyptian monuments against destruction by the fellah.

WE are glad to see that the Church of England Temperance Society has made representations to the Boards of the several English Railway Companies in regard to the supply of proper filtered water at stations. Suitable drinking fountains should be placed on every platform, and every refreshment room should be supplied with a proper filter where cold fresh water can be obtained. While we advocate these things, it is also well to give a word of warning. Drinking fountains and filters, unless carefully looked to, may become a serious danger to health, and the traveller, who at present may have to travel troubled with a thirst, may after all be better off than one who, having assuaged his thirst at a railway drinking fountain, has imbibed the germs of typhoid fever. It is for this reason that large properly-constructed cisterns, fitted up with a proper filtering apparatus, and placed in a cool position, well protected from dirt and air, are much safer than the smaller filters which are often seen in private houses and hotels, which not seldom are receptacles of dirt. But that drinking fountains, from which wholesome water can be obtained, should be found in every station we cannot doubt. The season of thirst is passing away, and that of cold is coming. We would, therefore, urge upon railway companies not only to put up drinking fountains, but to take better measures to warm waiting-rooms. The open fireplace warms only a narrow circle immediately around it, and it produces draughts. Every waiting and refreshment room should be uniformly heated by hot air or water. This is one of the greatest needs of the travelling public.

IN a communication to *La Construction Moderne*, September 13, an architect, M. Taravant, suggests the bold idea of hanging the centreing for large bridges instead of building it up. According to a diagram accompanying his article, he proposes carrying up a temporary wall in brickwork or masonry above the central portion of the pier between two intended arches of a bridge, and suspending from this a light system of iron bracing arranged somewhat like an inverted cantilever on either side of the central support, and to this system of iron bracing the timber centreing is to be fixed, following the quadrant form necessary for the half arch, which would be built on the centreing round the iron ties. How these are to be cut out and removed from the masonry afterwards is an important question, the answer to which may be given in the remainder of the article, which is decorated with an "à suivre" at the close. We presume it is hardly proposed that they should remain in the masonry. M. Taravant claims that on this principle much wider-span arches could be built than by depending solely on a built-up timber centreing. The advantage of the system, if it can be brought into use, would be most apparent in the case of viaducts on very lofty piers. For bridges of low proportions we doubt if it would offer any advantage either constructively or financially.

FROM some correspondence in the *Coventry Herald* it seems that the question what to do with the bells of St. Michael's is still a subject of agitation. The only point on which every one seems to be agreed is that the old tower will not stand a swinging peal of bells. The Rev. A. Starkey, the vicar of Ryton, writes to protest against erecting them as chiming bells, rightly saying tnat only by ringing do you get the full effect of bells. On the other hand he deprecates building a new campanile near the church, from fear of interfering with its architectural effect, and proposes building one at some distance on a site of its own, simply that Coventry people may have their bell peal again. That would be quite a mistake. The ringing of bells in peal has been associated with the church for ages; it would seem purposeless and lose half its beauty when "secularised." We believe it would be quite possible to build a campanile in contiguity to the church which would not spoil it architecturally, and that no other course will meet the case. It is desirable to have the bells rung and not chimed, and to have them rung in connexion with the church; and to build the new campanile is the only way in which this object can be carried out.

MR. ST. JOHN HOPE wrote to the *Times* of Monday a letter, dated from "The Museum, Silchester," which ought to command attention from the commonsense and reasonable views which the writer takes as to what can and cannot be done at Silchester. Mr. Hope is one of the professed antiquaries (there are not too many of them) who does not allow his antiquarian zeal to betray him into a forgetfulness of facts and possibilities. He is speaking only too truly in saying that "no English Government and no such body as the Hampshire County Council will ever spend money on the acquisition of any site of antiquarian interest." Mr. Hope does not "bring railing accusations," he contents himself with simply stating the fact, which is indubitable. We are not clear that it is even the duty of a County Council to do so; County Councils were appointed for other ends. A Government is less restricted in its functions, and might very properly expend money on such objects under certain conditions; but no one can expect the Government of this country to indulge in such weaknesses. Mr. Hope's suggestion is that a more permanent Museum should be built on the site, for the safer housing of objects found, and that excavations should be continued, but on a system of covering up each portion as soon as all information has been extracted from it that is possible, in order to preserve the remains from disintegration by the weather. A regular system of planning each uncovered portion and connecting it with the rest should be carried on, so as to have in time a complete plan of the Roman city, with bench marks left on the ground which will render it easy in future to uncover again any part that may be desired, for inspection, without unnecessary disturbance of the ground.

IT is much to be regretted that there should be apparently an intention of discontinuing the services at the Whitehall Chapel on account of the small attendances; and we believe that one reason which has been given as accounting for this slight attendance is the correct one, viz.: that most people imagine that the services are not open to the general public, and require an application to an official for admittance. We were asked the very question only a few days since. We will therefore do our part towards making it known that the Sunday services at the Chapel Royal are as freely open to all comers as those of any other church in London.

THE discussion as to architects and engineers, started by M. Bourdais in *L'Architecture* of August 16, has had to be brought to a close by the editing committee, after a lengthy reply from M. Bourdais in the number for September 13, summing up with the dogma that the union of the architect and engineer is the most desirable ideal for the production both of "constructions décorées" and of "décorations construites." The same number contains an enthusiastic communication from M. Frantz Jourdain, decrying all attempts to mix up the architectural profession with engineering, and summing up with the exhortation "Let us remain architects and try to become artists." In the course of his letter he asks whether MM. Dutert, Bouvard, and Nenot came out of the "Ponts et Chaussées" or out of the École Centrale, and whether they have not designed all their work (the large Exhibition buildings and the new Sorbonne) themselves. He admits that they did employ engineers, "payés à l'heure," to make their calculations, as they had draughtsmen to draw out their designs neatly, and "vérificateurs" to verify and regulate the quantities and estimates. "But this insignificant and ephemeral collaboration robs them in no

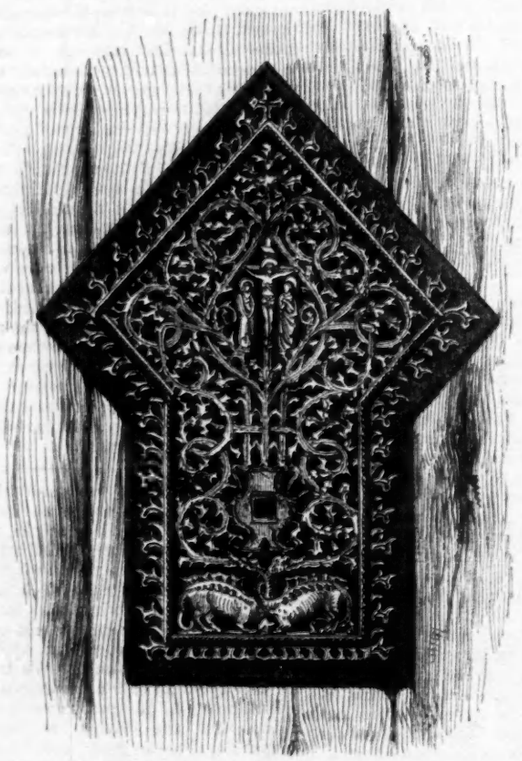
way of their personal merit and responsibility in the work"; nor is the public deceived in the matter. The names of the architects of the Exhibition buildings, the men who gave them their form and design, pass, we are told, from mouth to mouth in common conversation; "ceux des ingénieurs contrôleurs sont restés dans le painsgrey," which seems to be the French form of the English name for a well-known neutral tint. There is more truth in this remark than would be quite palatable to engineers. M. Jourdain heads his letter with a quotation from "Guy de Maupassant"—"Quand vous voyez un ingénieur, prenez un fusil et tuez-le." This reminds one of Blake's remark on being shown some engineering drawings—"Ah, sir! these things we artists hate!" The French architects have certainly the faculty of being amusing in these kind of discussions, which we fear cannot generally be said of our own countrymen; how much of this elaborate "chaff" is to be taken seriously is another question.

BRUCE CASTLE AND THE MANOR, TOTTENHAM.

This historical and ancient estate, now covering about 20 acres, is placed in the market, with a view to its development for building purposes. It stands in Lordship-lane that leads from the high road to Wood Green. Hard by is the parish church of All Hallows, restored and partly rebuilt in 1876-7. In the graveyard lies Margaret, wife of Mr. Samuel, civil engineer, and daughter of the Ettrick Shepherd. The property derives its name from having been the home of Robert, father of Robert Bruce, King of Scotland.

Computed at five hides or 128 acres, and valued at 25*l.* 15*s.* with 3 oz. of gold, the original Tottenham Manor, as undivided, belonged, *temp.* Edward the Confessor, to the Earl Waltheof, the Waldef of Domesday survey. Waltheof was son to Siward, Earl of Northumberland, to whom, as likewise to Macduff, Thane of Fife, is attributed the defeat of Macbeth. He married, in 1069, Judith, the Conqueror's niece, and daughter to Odo, Earl of de Balliol, and Henry de Hastings, descendants of David, Earl of Huntingdon.* These are the competitors for the Scottish crown at the death of Margaret, the Maiden of Norway, upon whose claims Edward I. was invited to adjudicate.

Robert de Brus's son Robert, Earl of Annandale and of Carrick, is said to have retired to this manor-house upon his return from a crusade in Palestine. Dying in 1304, he demised his share to his son and heir, Robert I. Upon the latter's revolt from England all his lands in this country were confiscated by Edward II. And so in course of time this part of the manor belonged, in 1429, to Alderman John Gedeney, being then held by a knight's service and valued at 10*l.* The two other portions were styled Pembrokes and Balliol or Dawbeneys. Bruce Castle, having suffered escheat to the Crown, was granted, in 1514, to Sir William Compton, Groom of the King's Bed-chamber. Compton set about to rebuild the house on plan pretty much as we now find it. It appears to have been completed in 1516, for on the Saturday after Ascension-day in that year,



Key Plate, probably German Mediæval Work.

Cover of a small Book, stated to have belonged to Queen Elizabeth: Silver Arabesque on Gilt Ground.

EXAMPLES OF DECORATIVE WORK.

EXAMPLES OF DECORATIVE WORK.

These two examples of the employment of decorative conventional foliage form a characteristic contrast in style and feeling, while both exhibiting the same general idea, that of foliated ornament drawn in flowing scrolls from a central or starting point. The Gothic design is thin, sharp, and crisp; the Renaissance one elegant, flowing and soft in its forms. Both are good examples of their class.

Prizes for Designs for Furniture, &c.—The Council of the Society of Arts hold a sum of 400*l.*, the balance of the subscriptions to the Owen Jones Memorial Fund, presented to them by the Memorial Committee, on condition of their spending the interest thereof in prizes to "students of the Schools of Art, who in annual competition produce the best designs for household furniture, carpets, wall-papers and hangings, damasks, chintzes, &c., regulated by the principles laid down by Owen Jones." The prizes will be awarded on the results of the annual competition of the Science and Art Department. Competing designs must be marked "In competition for the Owen Jones Prizes." The next award will be made in 1891, when six prizes are offered for competition, each prize to consist of a bound copy of Owen Jones' "Principles of Design," and the Society's Bronze Medal.

Albemarle. William I. had given it to his nephew-in-law, together with the earldoms of Huntingdon and Northampton. After the execution, at Winchester, of Waltheof, as a suspected traitor, in the year 1073, the manor, for an interval enjoyed by Judith his widow, devolved upon their daughter Maud, who brought it in marriage to King David I., son of Malcolm III., Cean-Mohr. David I. was confirmed by Henry I. in all of Waltheof's titles and possessions.*

As thus annexed to the earldom of Huntingdon, Tottenham Manor passed to Simon de St. Liz (Maud's first husband), and to his son and grandson of that title; and, on their failure in line, passed by royal grants to the Kings Malcolm IV. and his brother William the Lion, grandsons of David I., who died in 1153. William the Lion bestowed it upon his brother David, Earl of Huntingdon, whose son John, surnamed Le Scot, inherited from his mother, Maud, the earldom of Chester. John married Helen, daughter of Llewellyn of Wales, and died without issue. In 1254 a survey was taken for dividing the land between his co-heirs: Robert de Brus, John

* For some particulars of Waltheof's parentage and career see Charles Kingsley's "Hereward the Wake."

Henry VIII. meets his sister Margaret, Queen of Scots, "at Maister Compton's hous beside Totnam." Compton set up his coat-of-arms in the old porch; and is supposed to have built the three detached towers, one of which, near to the well, still stands. In 1605 it is bought by Thomas, Earl of Dorset; twenty years later Edward, Earl of Dorset, conveys it to two individuals, whose name is familiar in connexion with the history of the Grosvenor estate, London—Thomas and Hugh Audley. The Audleys, however, parted with the property within twelve months to Hugh Hare, elevated Baron Coleraine on August 31, 1625. His descendant, Henry, third Lord Coleraine, demised his estates to his natural daughter, Henrietta Duplessis, who (as the tale goes) being an alien could not succeed; yet the will, being legally executed, barred the heirs-at-law; so the property again escheated to the Crown. But a grant thereof was obtained by a private act in favour of Alderman James Townsend, who had married that lady. This James Townsend added an east wing on to the house which Lord Coleraine had new fronted with colgns and red brick. In Dr. Robinson's "History of Tottenham" (1840), is a plate copied, we gather, from Wolridge's picture, showing the Castle

as it appeared in 1686,* with another that shows the house as it was fifty years ago, with a third story added in lieu of the four gables. The front has a lofty central tower, with galleries and cupola, flanked by two octagonal towers half engaged. On September 24, 1789, Thomas Smith, of Gray's-inn, buys Bruce Castle, with sixty acres, for 6,800*l*. In 1827, John Ede, who pulled down the west wing, sells it, with fifteen acres, to the brothers T. W., Edwin, Frederick, and Rowland Hill (afterwards secretary of the Post Office), sons of Thomas Wright Hill, of Hazlewood School, Birmingham, who here established a boys' boarding-school that has continued to our own time. Dr. Robinson mentions a singular custom of this manor. At the death of the owner or tenant, his body was carried to the church through an opening made in the wall of the house, instead of through the porch. David I. of Scotland gave the church to the priory of Holy Trinity, London; Henry VIII. bestowed it upon the Cathedral of St. Paul.

* See also the corresponding woodcut in Hone's "Year Book" (1845).

THE PROBABLE EFFECTS ON WAGES OF A GENERAL REDUCTION IN THE HOURS OF LABOUR.

In the Section of Economic Science and Statistics, at the Leeds Meeting of the British Association last week (Professor Alfred Marshall, the President of the Section, in the chair),

Professor J. E. C. Munro, Owen's College, Manchester, read a paper on the above subject. In the course of his remarks, he said—A fixed, unvarying day for every worker is impossible, because (apart from the varying degrees of intensity of labour in different industries) of the necessity for preliminary work before the bulk of the labourers can begin their daily toil. We may assume for the purposes of this paper that a "normal week" for all skilled industries, due allowance being made for preliminary work, would correspond to forty-eight hours. From this point of view industries may be divided into three classes. 1. Those in which a normal day has already been established. In Cornwall, for instance, an eight-hours day has been in force for a long period of time in the mining industry. 2. Those in which the reduction would be of a moderate amount. Under this class may be placed industries where the reduction would not exceed 8½ hours per week—*e.g.*, if the working week were reduced from 56½ to forty-eight hours. (3) Those in which the reduction would be very substantial in amount. A general reduction in the hours of labour will at first reduce the net produce available for distribution amongst producers. It is true that any improvement in the efficiency of labour due to shorter hours, the impulse that may be given to the invention of labour-saving appliances, or greater economy in the use of labour, will tend to lessen the reduction in produce; but in all industries of the second-class (*i.e.*, where the reduction is moderate in amount), a class that includes most of the skilled industries of the country, the reduction in produce will at first correspond very closely to the reduction in hours. It has been suggested that the net production could and would be maintained (if not increased) by the employment of the unemployed. Such a suggestion implies that there is a class of unemployed possessing the requisite physical powers, mental intelligence, and technical skill required in the industries where the hours of labour are reduced. No such assumption can be granted. Indeed, there is ample ground for contending that, as far as skilled industries are concerned, the bulk of the unemployed do not possess the necessary skill to engage in them. The length of the hours of labour is not the chief cause of want of employment. Excessive hours of labour are themselves the result of causes which would largely remain in force even if the hours of labour were shortened, and whilst the shortening of hours might benefit in one way the unfortunate class whose condition is described in the "Lords' Report on Sweating," it will not of necessity maintain or improve their wages. Shorter hours of labour may co-exist with poverty, especially where the supply of unskilled labour is large and combination is absent. Low wages are largely responsible for the long hours of the unskilled worker, and the first step towards the amelioration of his position would be a rise in wages rather than a shortening of hours, as the latter would follow the former. Let us, however, assume that by the employment of additional hands the net produce (say in a year) is maintained. We have now the same amount of net produce as before, but a greater number of producers. In other words, though the total produce is the same, the production per producer per year is reduced, and from the point of view of distribution the net production per head per annum is of greater importance than the net produce. Before considering on which of the classes of producers loss in production will fall, the question arises, Will the loss be restricted to those industries (*a*) in which the reduction takes place, or will it extend to other industries (*b*)? If the (*a*) producers consume their own products the loss will fall on them; but, as a rule, one form of wealth is created in order to be exchanged for another form, and hence to the extent that the (*b*) producers are consumers of the (*a*) produce they will participate in the reduction of the net produce. If the demand of the (*b*) producers continues in intensity they may have to bear the whole loss; on the other hand, the demand may fall off to such a degree that the (*a*) producers will suffer; but the probability is that the loss will be shared between the two classes, and therefore all industries will tend to be affected. A reduction of hours in some trades will tend to affect all other trades, inasmuch as by the migration of capital and labour the reduction in the net produce may be spread over all industries. Whether the capitalist or the labourer will bear the loss will depend largely on two considerations, viz., (1) the extent to which labour or capital migrate to foreign countries, and (2) the effects of the reduction of hours on population and on capital. The effects on capital are so important as to require separate consideration; and since population will not be directly affected we have only to consider the possibility of capital and labour migrating to other countries. In this respect capital has the advantage. Owing to the growth of banking and financial houses, and the development of foreign trade, capital possesses an international organisation, and can be promptly and readily directed to the best openings. Labour, on the other hand, moves slowly; it deteriorates by non-use, and possesses no international organisation. It is, therefore, highly probable that a large share of the reduction in the net produce, due to shorter hours, will be thrown upon labour. It remains to consider how far the foregoing conclusions may be effected by (1) monopolies; (2) combination; (3) methods of paying wages. (1) A monopolist, whether a private person or a group of persons, or a municipality, or a State, will usually be able, according to the intensity of the monopoly, to throw the whole or part of the loss due to a reduction in the hours of labour in his industry upon those who use the article or the service subject to the monopoly. (2) Combination may be resorted to by labour as a method of preventing outside labour from coming into an industry. To the extent that combination enables producers to control the production of a given article, to that extent a trade may escape sharing in a loss due to a reduction of hours in other trades. (3) Hitherto the methods of paying wages have not been taken into account. As a rule, wages in the skilled trades are paid by piecework; the spinner and the weaver receive a certain rate of wages for every yard they spin or weave respectively; the miner is paid by the ton, and the bricklayer by the yard. In other trades wages are paid by the hour, whilst in the unskilled industries wages are paid by the day of a varying number of hours. A reduction of hours where piecework prevails would not *ipso facto* affect the "rate" of wages, but would lessen the "amount" of wages, inasmuch as a fewer number of yards would be woven and a fewer number of tons obtained in the shorter hours. The wages earned in a year would be reduced in proportion to the reduction in hours. But this would not leave the capitalist in the same position as before, as he would have a smaller gross return on the same amount of fixed capital; and if he has only been receiving an economic return before, a reduction in the "rate" of wages may be required to prevent a migration of capital into some other industry. Where wages are paid by the hour similar results would follow. In both the above cases the method of paying wages is such that a reduction of hours reduces automatically the "amount" of wages without affecting the "rate" of wages; but where labour is paid by the day the method of payment will, if no alteration takes place, continue the same wages as before for a smaller amount of labour. In so far as the net produce is diminished a check will be given to the accumulation of capital. Capital will tend to avoid undertakings where the reduction of hours lengthens the time of completion. Where interest is paid on capital out of capital during the construction of the works, any extension of time will necessitate a corresponding increase in the capital required, just as any contraction of such time will reduce the capital required. Hence we reach the conclusion that the reduction in the hours of labour may check the accumulation of capital and cause at the same time an increased demand for it, and so raise the rate of interest. The adoption of a double shift, say of eight hours each, instead of one shift of, say, ten hours or twelve hours, will increase production more than the reduction of hours diminished production, and as such a system is only possible in certain trades, its sudden adoption will affect relative values. Turning to the products of labour that are bartered between nations, a reduction in the hours of labour may (1) destroy the gain arising from international trade, or (2) only diminish it. Where an exporting country possesses a monopoly of production arising out of climate or natural resources, it will be able to make a better bargain in the export market than if such a monopoly did not exist. To the extent that a country reducing its hours of labour possesses a monopoly of production, it may throw a large portion of the loss on its foreign customers. But a monopoly that depends on special productive power may be destroyed by a reduction in hours, and foreign customers may be able to obtain better terms from other States. The main conclusions, then, at which we have arrived may be summed up as follows:—1. That a reduction in the hours of labour which is neither universal nor uniform will tend to reduce the net produce available for division amongst the producing classes, but such reduction may be lessened or counteracted by greater efficiency in labour and in the use of capital. 2. Capital will be able to throw a portion of the loss on labour, and labour generally will be affected. 3. That any check to the accumulation of capital due to the reduction in the net produce will tend to raise interest and lower wages, but this may be avoided to some extent by the more economic use of capital. 4. That the reduction in hours will not necessarily lessen the number of the unemployed, inasmuch as it will not increase the purchasing power of the consumer, and will not affect the chief causes of poverty incident to our present organisation of industry. 5. That the position of the chronic unemployed or residuum will not be materially improved. 6. That in so far as additional labourers are employed to maintain the net produce, it will be at the expense of other workers, if the net produce remains the same but the number of producers increases.

In the discussion which followed (we condense somewhat from a longer report in the *Leeds Mercury*),

Sir Douglas Galton said he wished to emphasise the very great importance of the health of the working man. Health depended largely upon diversity of occupation, and the more we concentrated our working men on special work, the more necessary it was that working men should have leisure hours for recreative purposes. He should advocate, and hoped to see some day, a larger number of gymnasia in our towns, and other means for physical recreation. We might then hope that our population would increase in stamina and strength, and we might, perhaps, hope to rival the ancient Greeks, who devoted so much time to these exercises. He was strongly opposed to an eight hours day being brought about by Act of Parliament.

Professor A. T. Hadley (Yale College, U.S.A) said that some years ago it happened that in the State of Massachusetts the hours of labour in the factories were ten per day; in Connecticut they were, generally speaking, eleven, and a careful investigation was made ten years ago by Colonel Wright, of the United States Labour Bureau, into the effect of this difference. The result was surprising, for the statistics showed that the output per day was slightly greater (although only a nominal difference) in the ten-hour mills of Massachusetts than in the factories of Connecticut, where eleven hours per day were worked. A suggestion that this

was due to the health of those working eleven hours being injuriously affected, and that consequently they did not work so well as those who enjoyed the extra hour for recreation, was thoroughly investigated, but was found not to meet the facts of the case. In the end it was discovered that the difference was largely due to the fact that the workmen at the Massachusetts mills were of a superior class to those in Connecticut. There was a process of natural selection going on amongst those who did not mind the long day and could not stand the increased pace, and those who cared more for the extra hour of leisure and minded less the necessity for increased exertion. When men worked shorter hours they must increase their output in order to compete with those working longer hours. Suppose there was a general reduction of hours, and the output was maintained, things would go on as usual; but if the output were lessened, there must be an increase in the cost of production, and, in consequence, a diminished demand for the goods.

Mr. Sydney Webb said he did not agree with Professor Munro when he laid such stress on the almost inevitable necessity of the production being so much reduced by a reduction of the hours of labour. Experience showed that a reduction of the hours of labour had been accompanied by an increase of production. It was, of course, unfair to suppose that a similar increase would hold to a corresponding extent by the reduction from ten hours to eight, or from eight to six. Although Professor Munro argued well in favour of an eight hours day, he was too much afraid that prices would rise merely because the cost of production had increased. The cost of production had little to do with prices, and he could not see how it would have much to do with capital which was not employed at the margin.

Professor Sidgwick remarked that a great deal of Mr. Webb's argument seemed to ignore the fundamental propositions of Professor Munro's paper. He (the speaker) agreed to a great extent with the chief economic conclusions of that paper. He agreed with Mr. Munro as to the very different effect that this change would have upon different industries, producing thereby, as a natural result, a disturbing effect in the exchanges as among the industries. He would also lay stress on the fact to which Mr. Munro directed attention, that it was *primâ facie* absurd to have the same rule applied to all industries, considering the very varying degrees of hardness in the work when they passed from one industry to another. He held it reasonable to expect that in most cases the decrease in produce as a whole would be very material, and more than they could expect to be counteracted either by the improvement in the personal quality of the labour or by the improvement in the instruments, or their adaptation to labour so far as that improvement was caused by the change. It was sometimes supposed that loss would be prevented by a change in the proportion of the employed. Though, no doubt, a certain increase must be expected when the change occurred, still, if they looked at the causes of the want of employment, they would find that they were not of the kind that this change could tend permanently to remove, and they could look forward to no gain from that cause; and, as had been said, the disorganisation of the industry would largely operate in the opposite way. As to the question of the adaptation of capital, he thought the most important suggestion was the double shift. He had always been interested in the question whether great gain in the efficiency of labour might not come from more extensive use in manufactures of the double shift, and if the introduction of the normal week took place he should hope for some compensation in that way.

Mr. G. G. W. Balfour, M.P., replied to some of the arguments adduced by Mr. Sydney Webb.

Mr. John Leech remarked that the curtailment of the hours of labour must inevitably enhance the cost of production, it being generally conceded that a limitation of the hours of labour would not be accompanied by a corresponding reduction of wages. The cost of the articles produced would be increased, and that would in all probability have a serious effect upon our foreign trade, and also upon our home trade. With our present system of fiscal arrangements we should be compelled to receive from foreigners a great number of articles for home consumption that we now supplied ourselves, and we should be unable to export to foreign nations many goods we now made in consequence of the increased cost. Unless we could arrange that the hours of labour in foreign countries should be limited to the same as in our own country, we should be at a great disadvantage.

Mr. R. H. Inglis Palgrave said it was probable that some persons there had had the price of gas raised in consequence of the increased cost of production. He happened himself to be interested in that manufacture, and to the great regret of those concerned in the management, within the last few days the price of gas had had to be raised, simply and solely in consequence of the rise in the cost of production.

Mr. J. H. Levy said that Great Britain was a country that carried on its trade to a much larger extent with the use of capital than other countries; that was to say, the production of our goods was much more that of capital than of labour. Now, if they proceeded in the way that Mr. Sydney Webb would have them do, they would increase very largely the cost of production of the articles into which labour entered, while they would not increase in the same way the cost of production of the articles into which capital entered, and that would have the result that manufacturing industry would receive a considerable impetus at the expense of our agricultural industry, and our land would still further go out of cultivation. It would be a bad thing if this were brought about by any such artificial means as an Eight Hours Bill passed as an Act of Parliament.

Mr. Stephen Bourne remarked that he longed for the time when eight hours would become the privilege and right of labour in this country. Although he had been accustomed for fifty years of his life to do a larger amount of labour than that himself, he believed that eight hours a day was quite a sufficient period for a man to be employed at work; but any legislative enactment to insist upon these reduced hours would simply produce such a derangement of economic arrangements at home as would absolutely destroy a very large amount of our foreign trade. To his mind, the tyranny which Trades Unions was exerting over a large number of the labouring population of our country was forcing them to take measures which were contrary to their real interests.

Professor Munro having replied,

The President, referring to some tabulated statistics in Prof. Munro's paper, asked whether they would believe that in this civilised country the Government had hitherto positively refused to attempt to collect industrial statistics. This was the only civilised country absolutely devoid of these figures. What they wanted was an expression of public opinion in favour of the Government providing the few thousand pounds required for an Industrial Census Department, organised on economic grounds, and managed by economists or by men of business. The establishment of such a department would bring about a gain to the country very much greater than the trifling amount it would cost. Proceeding to discuss points raised by Professor Munro, the President said that the fundamental weakness in the argument of those who favoured a reduction in the hours of work was that it would raise wages, and he had also seen it assumed that one effect of the change would be to diminish the number of unemployed. He did not think there was any evidence of that. They would require clearer evidence than they had as to how many men there were unemployed who were willing to work or capable of working. And he should wish to exclude those men who, having grey hairs, were not worth to the employer the full Trades Union wages for the district, and who were, therefore, prohibited by their Unions from working. He believed that if the Unions would allow men who had become old, and were, therefore, not as efficient workmen, to work for less than the standard wages, a great deal of wrong would be remedied. With regard to foreign trade, he thought foreign competition was important in this way,—if we were to work less, and consequently to endeavour to make capital content with a lower rate of interest, capital would, so far as possible, and to a very great extent, migrate to other countries. If, however, the reduction were universal, this would be avoided. From that it might be admitted that an international movement would be easier than a national one; but that was nearly all he was prepared to allow in the argument that foreign competition was a bar to a reduction of hours of labour which was not universal. A change in the hours of labour which did not disturb the relative values of things would not disturb foreign trade. Looking at the question generally, he should put it in this way,—a reduction of the hours of labour would in most trades, not in all, diminish the output. Part of the loss would be thrown upon the capitalist. If the change was introduced spasmodically, it would disorganise labour; but if it was introduced gradually capital would bear a little more diminution of income than labour. If a reduction from ten hours to eight had the effect of diminishing the output by 20 per cent., he thought it probable that the day's wages would fall something less than 10 per cent. if brought about gradually, the rest being borne by capital. The question arose whether it was worth while, and it was one incapable of any universal solution. He could not admit that eight hours was too long for anybody to work. Much of what was called work he should call looking on. As regarded the children, he was of opinion that factory legislation had not gone anything like far enough. Children should not leave school as early as they did at present. Such a tax on the community as would be necessary if children were kept longer at school would diminish the incomes of the present generation but slightly, and it would increase them in the next generation tenfold.

THE MARBLES AND ORNAMENTAL ROCKS OF THE MEDITERRANEAN.*

While the waters of the Mediterranean Sea are opalescent, abounding with fish of the most exquisite colours and hues, and with sea-weeds equally beautiful, the rocks which surround this basin sea, along with those of its islands, are equally beautiful in colour, and have from the earliest times supplied nearly the whole of the valuable marbles used for the architectural adornment of the cities of Greece and Rome, and if we only include a moderate inland belt of the coast line within the watershed to this sea, we can then call almost every fragment of ancient marble found in Greece and Rome and their colonial cities Mediterranean marbles.

The classic Greeks may be considered the pioneers in the working of marbles, the origin of which is easy to understand. White marble was the stone most easily obtainable in large sizes for architectural purposes, and no doubt this choice material, which was capable of taking and retaining the most delicate chiselling with its ivory-like tinting and semi-transparency, played its part in the refinement of both architecture and sculpture in the ancient world, and it is possible that the outcome of their refined colour-decoration may have been in great measure requisite to subdue its dazzling brightness under an Eastern sun.

The Romans, in their turn, endeavoured to obtain lasting colour in their buildings by the introduction of coloured marbles, which the Greeks had all but neglected, the result of which introduction was the magnificent colour decoration of Rome and Byzantium, the influence of which has continued through all architectural changes and styles down to the present time.

The demand is now so great for varieties of choice coloured marbles, not only for architectural decoration, but for articles of vertu and furniture, that not only has search been made for the various quarries of the ancients (all of which except one have been discovered), but hundreds of new ones have been opened and worked in every part of the explored globe. In the midst of all this modern adventure, the ancient quarries of the Greeks and Romans on the shores of the Mediterranean still retain their pre-eminence.

Greece has her white-marble quarries at Mount Pentelicus; these supplied the material for the Acropolis of Athens and the Greek temple of Jupiter Olympus, and the Pantheon of Rome; those of Paros produced the finest material for sculpture, and also, in my opinion, the marble for Herod's temple at Jerusalem. Several of the islands also produce good white marbles, and in all these white formations are found every variety of greys. The Cipolinos were quarried chiefly at Carystus, from whence were taken the monoliths for the temple of Antoninus and Faustina in Rome. These are the largest marble columns known.

* By Mr. W. Brindley, F.G.S., F.R.M.S. Read before the Geological Section of the British Association Meeting at Leeds, 1890.

The beautiful Verde Antica green porphyry comes from near Sparta, and the green marbles from the shores of Magnesia, Thessaly, and Tinos.

The Rosso Anticos have all been refound on the coast between Cape Matapan and Gythium.

The grand quarries of Porto Santo are still workable at the island of Chios; black marbles are found in several places, and varieties of pavonazzetto at Skyros.

The famous quarries of Synada, in Asia Minor, which supplied Rome with her monoliths of Pavonazzetto marble, were found last year. There are sixteen quarries of immense size, alongside of each other; these are about to be re-worked.

Between Smyrna and Ephesus are white marble quarries, but the most important blocks used for the Temple of Diana, at Ephesus, came from Pentelicus or Paros, although some may have been taken from Samos.

At Tarsus are quarries of ivory white marble, from which the Temple was built. All the white marble used in Egypt came from the Mediterranean.

History tells us little about the old quarries of Greece, but the architectural remains of Greek and Roman cities show plainly that their produce was enormous; eight-tenths of the white marble found in Rome is Greek; and the quantity of worked material recklessly burnt as lime for centuries must have been enormous.

Byzantium was chiefly built with the marbles of the Sea of Marmora; and these quarries are still worked for Constantinople; and most likely this sea takes its name from being really a marble basin.

The produce of the quarries of Egypt brought down the Nile for Roman use may be called Mediterranean, the most valuable of which were those of imperial red Porphyry; these are now being re-worked, the first important consignment of 270 small blocks having this last month arrived in London, the remains of ancient working on some of these blocks being most interesting, showing that they not only wedged, scabbled, and chiselled, as is now done, but that they even sawed blocks of this hard material asunder.

The Breche Verde of Egypt, the granites and oriental alabasters, were all extensively worked and floated down the Nile for shipment to Rome and other cities.

Ancient Numidia (now the eastern portion of Algeria and the west of Tunis), produced the Giallo Antico; these quarries are very extensive, the Romans having quarried right through the mountains; from here came the yellow monolith columns of the Pantheon in Rome, and those of the Arch of Trajan, now re-used in that of Constantine.

At a number of places along the Algerian coast are ancient quarries of rich coloured marbles, chiefly reds and yellows; from those of "Cape Chenoua," near the ancient Julia Cæsarea, the capital of Mauritania, was brought the rich red marble (rouge Etruscan) used for the decoration of the new rooms and staircase at the National Gallery, London. Further west, at Kleber, near Oran, there are the famous quarries of Sig. Del Monto; these marbles are unquestionably the richest (as regards reds and breccias of red, yellow, and browns) that have ever been discovered in any part of the world; they are now largely used in America. The Algerian onyx marbles are found near Oran, and red ones have recently been discovered at Guelma, in the west of Algiers. The Mediterranean coast of Spain for thirty miles inland abounds with marbles of every colour.

There is first the sparkling crystalline statuary of Macael with which the Alhambra was built, the rosy veined of Tarragona, the rich Broccatellos and jaspers of Tortosa, the red and orange blended Brocatellos and onyx of Malaga, the Griotte deep reds, blue Turquin and fossil of Gevona; also the precious green Serpentine of Granada, which has scarcely a rival in richness of colour and firmness of texture. Many of these were worked by the early Romans and Moors.

On the French Coast are quarried a number of deep and light reds and brecciated yellow.

The ancient quarries of Luni, now Carrara, are at the present day the most renowned in the world, and considered, with the adjoining ones of Massa and Seravezza, to cover an area of 27 square miles. The marble rocks commence a little above the sea-level, and extend up the mountain to an altitude of 7,000 ft., the whole of the sides and valleys of these mountains being studded with innumerable quarries, giving employment to 15,000 people, the result of whose labour supplies probably 90 per cent. of the white marbles used in the world.

These quarries were known and worked by the Romans, and have been worked continuously since before Christ, but the immense development has taken place within the last fifty years, or we might even say the last thirty years.

Probably no single individual has visited the whole of these quarries, not even interested residents. To see and examine them all would take an entire season.

The most valuable marbles of the Appenine range are those of Mont Altissimo, at Seravezza, situated at an altitude of 7,000 ft.; here the most beautiful and durable statuary is found in immense beds, masses being extracted of the purest quality containing thousands of feet cube, the value per foot being 2*l*., or even more; single blocks worth 500*l*. each are often obtained, and occasionally up to 1,000*l*. This marvellous mountain of Altissimo produces also a statuary grained marble of blueish tint, nearly the whole of which is sent to France for statuary purposes, as it is extremely durable for exterior work. The famous coloured breccias of grey, red, and purple, the Rhondona, Toir de Perchia, and others, are found here in large masses, also the blue-veined Bardilio and a Cipollino. The promontory of the Gulf of Spezzia (Porto Venere) is one massive rock of black and gold marble. Near Genoa are the quarries of Green serpentinous limestone; the one containing red spots is called in commerce Egyptian.

Similar marbles are found in Corsica, also the purple-veined (Fior de Persico), and a rich mixed green and amethyst coloured granite used largely in the Medici Chapel at Florence; the orbicular granite (Napoleonite) is also obtained from this island.

Between Sienna and the coast there are the rich quarries of Sienna yellow (this beautiful marble is not found in ancient Rome).

At Voltera, near this coast, is obtained the pure white Italian alabaster; and at Prato, the deep olive-green serpentine used so extensively at Pisa and Florence.

At Mount Rommola, near the coast, are ancient quarries of statuary white.

Sicily contains several good marbles. Near Trappini, on the west, the choice jaspar marble is obtained, also the rich coloured silecous jaspars.

At Tauromena are quarries of reds and browns.

The rocks of Brindisi and those of the opposite Adriatic coast, up to Istria, are a fine-grained white limestone; this is the stone with which the Venice palaces are built, the white sort being the Palambino, found in Mosaic pavements. East of Trieste a useful red marble, like the Brocatello of Verona, is worked very extensively.

I hope, in conclusion, this short but very imperfect summary may give some idea of the money wealth in the Mediterranean rocks.

ARCHITECTURAL ASSOCIATION VACATION VISITS:

KNOLE HOUSE.

THE fifth vacation visit was made on Saturday last to Knole House, the seat of Lord Sackville, when a party of over thirty members visited this remarkably fine and interesting Elizabethan and Jacobean mansion. Knole appears to have been a notable manor-house from very early times, and for a considerable period was associated with the Archbishops of Canterbury, by whom it was used as a country seat, together with their palace at Otford. Knole was bought for 400 marks by Thomas Bourchier, Archbishop of Canterbury, in 1456, from William, Lord Saye and Sele, the son of the Lord Treasurer, who perished in the insurrection of Jack Cade. Archbishop Bourchier rebuilt the house and enclosed the park, and possibly some of the ruins which are situated to the east of the mansion may have formed part of Bourchier's work, besides what remains of it in the present building. Archbishop Morton, successor to Bourchier, enlarged the house and received there as guest King Henry VII. Henry Dean and William Warham, successors to Morton, resided occasionally at Knole, Warham in particular having there several times entertained Henry VIII. In the days of his successor, Cranmer, however, the spoliation of the Church had been begun by Henry and his courtiers, and the Archbishop was therefore under the necessity of giving up Knole together with other possessions of the See in order to save the remainder. The house and manor belonging to the King, he then bestowed them on John Dudley, Earl of Warwick, afterwards Duke of Northumberland; on his attainder in the first year of Queen Mary the property reverted to the Crown, and she granted it to Cardinal Pole, and at his death, in 1558, it again came into the possession of the Crown. Elizabeth presented the Manor to Sir Robert Dudley, afterwards Earl of Leicester, but he again surrendered it to her and she then bestowed it upon Thomas Sackville, first Earl of Dorset, who came to reside here in 1603, and constantly employed two hundred men upon alterations and repairs until his death in 1608; it is, therefore, in the highest degree probable that it was during these years that the greater part of the existing features of the house were carried out, and the character of the work would certainly bear out this assumption. For a time, owing to the extravagance of Richard, grandson of the first Earl of Dorset, the property was sold to Henry Smith, Alderman of London, whose benefactions to various parishes in the counties of Kent and Surrey are of a very considerable extent. By his trustees, however, the property was again sold to Richard Sackville, Earl of Dorset, nephew to the former, in 1661, since which time it has continued in the possession of his descendants. The present title of Baron Sackville was revived in 1876 in favour of Mortimer Sackville-West, brother of the present Peer.

Architecturally, the main features of the plan are the two great quadrangles, one behind the other. Entering the first by the carriage entrance, and noting the horn lanterns and silver maces, one receives a foretaste of the distinguishing characteristic of Knole, its richness in old furniture, decorations, and accessories of Jacobean and later periods. In the outer quadrangle are replicas of ancient statues, a gladiator and a Venus, *orta mari*. From the outer to the inner quadrangle the entrance is below a massive tower which forms the central feature of the principal front of the outer court. Fronting us as we enter the inner quadrangle is a colonnade, evidently a later addition to the outer wall, and through this we enter the house and reach the great hall, still the important feature of the interior, whose dimensions are 74 ft. 10 in. in length, 27 ft. in width, and 26 ft. 8 in. in height.

The screen through which we enter, and the minstrel-gallery over, decorated with the arms of the first Earl of Dorset and his Countess, is a good example of the Jacobean treatment of this feature, but loses all charm by reason of its having been "painted four times in good oil colours, grained wainscot, and twice varnished," the wainscoting and other woodwork of the hall having shared the same fate. Even the fireplace has been "grained imitation marble," which, however, throws into stronger relief the high character of the beautiful workmanship of the fire-dogs, which, we are told, were brought from Hever. The principal staircase, one only of the sixty or eighty said to be in the house, has likewise suffered from the attentions of the eighteenth-century painter and decorator, which detracts much from one's enjoyment of the really pleasing design and arrangement of its planning. Remembering the effect of Hatfield, Audley End, and other houses of this period visited lately by the Association, it is pitiable to realise how much charm has been lost by the vagaries and vandalism of vehicle and varnish. In passing through the principal reception rooms, the richness of the house in fine pictures is especially noticed, as when we find, for example, that the Crimson Drawing Room is completely hung with works of Sir Joshua Reynolds, any one of which would make an ordinary man proud. Tapestry, too, of somewhat late date it is true, but exquisite in design, execution, and preservation, meets our view repeatedly, notably in King James' Room, and in the Chapel. The collection of ancient silver also, in King James' room and elsewhere in the house, is remarkable both for its design and its intrinsic value. The number of ebony and other carved cabinets would in themselves signalise many a museum of ordinary size, while ancient Oriental carpets and rugs, hangings and upholstery of costly embroidery, and other rare and valuable bric-à-brac, afforded the visitors a treat which

was due to the health of those working eleven hours being injuriously affected, and that consequently they did not work so well as those who enjoyed the extra hour for recreation, was thoroughly investigated, but was found not to meet the facts of the case. In the end it was discovered that the difference was largely due to the fact that the workmen at the Massachusetts mills were of a superior class to those in Connecticut. There was a process of natural selection going on amongst those who did not mind the long day and could not stand the increased pace, and those who cared more for the extra hour of leisure and minded less the necessity for increased exertion. When men worked shorter hours they must increase their output in order to compete with those working longer hours. Suppose there was a general reduction of hours, and the output was maintained, things would go on as usual; but if the output were lessened, there must be an increase in the cost of production, and, in consequence, a diminished demand for the goods.

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Mr. John Leech remarked that the curtailment of the hours of labour must inevitably enhance the cost of production, it being generally conceded that a limitation of the hours of labour would not be accompanied by a corresponding reduction of wages. The cost of the articles produced would be increased, and that would in all probability have a serious effect upon our foreign trade, and also upon our home trade. With our present system of fiscal arrangements we should be compelled to receive from foreigners a great number of articles for home consumption that we now supplied ourselves, and we should be unable to export to foreign nations many goods we now made in consequence of the increased cost. Unless we could arrange that the hours of labour in foreign countries should be limited to the same as in our own country, we should be at a great disadvantage.

Mr. R. H. Inglis Palgrave said it was probable that some persons there had had the price of gas raised in consequence of the increased cost of production. He happened himself to be interested in that manufacture, and to the great regret of those concerned in the management, within the last few days the price of gas had had to be raised, simply and solely in consequence of the rise in the cost of production.

Mr. J. H. Levy said that Great Britain was a country that carried on its trade to a much larger extent with the use of capital than other countries; that was to say, the production of our goods was much more that of capital than of labour. Now, if they proceeded in the way that Mr. Sydney Webb would have them do, they would increase very largely the cost of production of the articles into which labour entered, while they would not increase in the same way the cost of production of the articles into which capital entered, and that would have the result that manufacturing industry would receive a considerable impetus at the expense of our agricultural industry, and our land would still further go out of cultivation. It would be a bad thing if this were brought about by any such artificial means as an Eight Hours Bill passed as an Act of Parliament.

Mr. Stephen Bourne remarked that he longed for the time when eight hours would become the privilege and right of labour in this country. Although he had been accustomed for fifty years of his life to do a larger amount of labour than that himself, he believed that eight hours a day was quite a sufficient period for a man to be employed at work; but any legislative enactment to insist upon these reduced hours would simply produce such a derangement of economic arrangements at home as would absolutely destroy a very large amount of our foreign trade. To his mind, the tyranny which Trades Unions was exerting over a large number of the labouring population of our country was forcing them to take measures which were contrary to their real interests.

Professor Munro having replied,

The President, referring to some tabulated statistics in Prof. Munro's paper, asked whether they would believe that in this civilised country the Government had hitherto positively refused to attempt to collect industrial statistics. This was the only civilised country absolutely devoid of these figures. What they wanted was an expression of public opinion in favour of the Government providing the few thousand pounds required for an Industrial Census Department, organised on economic grounds, and managed by economists or by men of business. The establishment of such a department would bring about a gain to the country very much greater than the trifling amount it would cost. Proceeding to discuss points raised by Professor Munro, the President said that the fundamental weakness in the argument of those who favoured a reduction in the hours of work was that it would raise wages, and he had also seen it assumed that one effect of the change would be to diminish the number of unemployed. He did not think there was any evidence of that. They would require clearer evidence than they had as to how many men there were unemployed who were willing to work or capable of working. And he should wish to exclude those men who, having grey hairs, were not worth to the employer the full Trades Union wages for the district, and who were, therefore, prohibited by their Unions from working. He believed that if the Unions would allow men who had become old, and were, therefore, not as efficient workmen, to work for less than the standard wages, a great deal of wrong would be remedied. With regard to foreign trade, he thought foreign competition was important in this way,—if we were to work less, and consequently to endeavour to make capital content with a lower rate of interest, capital would, so far as possible, and to a very great extent, migrate to other countries. If, however, the reduction were universal, this would be avoided. From that it might be admitted that an international movement would be easier than a national one; but that was nearly all he was prepared to allow in the argument that foreign competition was a bar to a reduction of hours of labour which was not universal. A change in the hours of labour which did not disturb the relative values of things would not disturb foreign trade. Looking at the question generally, he should put it in this way,—a reduction of the hours of labour would in most trades, not in all, diminish the output. Part of the loss would be thrown upon the capitalist. If the change was introduced spasmodically, it would disorganise labour; but if it was introduced gradually capital would bear a little more diminution of income than labour. If a reduction from ten hours to eight had the effect of diminishing the output by 20 per cent., he thought it probable that the day's wages would fall something less than 10 per cent. if brought about gradually, the rest being borne by capital. The question arose whether it was worth while, and it was one incapable of any universal solution. He could not admit that eight hours was too long for anybody to work. Much of what was called work he should call looking on. As regarded the children, he was of opinion that factory legislation had not gone anything like far enough. Children should not leave school as early as they did at present. Such a tax on the community as would be necessary if children were kept longer at school would diminish the incomes of the present generation but slightly, and it would increase them in the next generation tenfold.

THE MARBLES AND ORNAMENTAL ROCKS OF THE MEDITERRANEAN.*

WHILE the waters of the Mediterranean Sea are opalescent, abounding with fish of the most exquisite colours and hues, and with sea-weeds equally beautiful, the rocks which surround this basin sea, along with those of its islands, are equally beautiful in colour, and have from the earliest times supplied nearly the whole of the valuable marbles used for the architectural adornment of the cities of Greece and Rome, and if we only include a moderate inland belt of the coast line within the watershed to this sea, we can then call almost every fragment of ancient marble found in Greece and Rome and their colonial cities Mediterranean marbles.

The classic Greeks may be considered the pioneers in the working of marbles, the origin of which is easy to understand. White marble was the stone most easily obtainable in large sizes for architectural purposes, and no doubt this choice material, which was capable of taking and retaining the most delicate chiselling with its ivory-like tinting and semi-transparency, played its part in the refinement of both architecture and sculpture in the ancient world, and it is possible that the outcome of their refined colour-decoration may have been in great measure requisite to subdue its dazzling brightness under an Eastern sun.

The Romans, in their turn, endeavoured to obtain lasting colour in their buildings by the introduction of coloured marbles, which the Greeks had all but neglected, the result of which introduction was the magnificent colour decoration of Rome and Byzantium, the influence of which has continued through all architectural changes and styles down to the present time.

The demand is now so great for varieties of choice coloured marbles, not only for architectural decoration, but for articles of vertu and furniture, that not only has search been made for the various quarries of the ancients (all of which except one have been discovered), but hundreds of new ones have been opened and worked in every part of the explored globe. In the midst of all this modern adventure, the ancient quarries of the Greeks and Romans on the shores of the Mediterranean still retain their pre-eminence.

Greece has her white-marble quarries at Mount Pentelicus; these supplied the material for the Acropolis of Athens and the Greek temple of Jupiter Olympus, and the Pantheon of Rome; those of Paros produced the finest material for sculpture, and also, in my opinion, the marble for Herod's temple at Jerusalem. Several of the islands also produce good white marbles, and in all these white formations are found every variety of greys. The Cipolinos were quarried chiefly at Carystus, from whence were taken the monoliths for the temple of Antoninus and Faustina in Rome. These are the largest marble columns known.

* By Mr. W. Brindley, F.G.S., F.R.M.S. Read before the Geological Section of the British Association Meeting at Leeds, 1890.

The beautiful Verde Antica green porphyry comes from near Sparta, and the green marbles from the shores of Magnesia, Thessaly, and Tinos.

The Rosso Anticos have all been refound on the coast between Cape Matapan and Gythium.

The grand quarries of Porto Santo are still workable at the island of Chios; black marbles are found in several places, and varieties of pavonazzetto at Skyros.

The famous quarries of Synada, in Asia Minor, which supplied Rome with her monoliths of Pavonazzetto marble, were found last year. There are sixteen quarries of immense size, alongside of each other; these are about to be re-worked.

Between Smyrna and Ephesus are white marble quarries, but the most important blocks used for the Temple of Diana, at Ephesus, came from Pentelicus or Paros, although some may have been taken from Samos.

At Tarsus are quarries of ivory white marble, from which the Temple was built. All the white marble used in Egypt came from the Mediterranean.

History tells us little about the old quarries of Greece, but the architectural remains of Greek and Roman cities show plainly that their produce was enormous; eight-tenths of the white marble found in Rome is Greek; and the quantity of worked material recklessly burnt as lime for centuries must have been enormous.

Byzantium was chiefly built with the marbles of the Sea of Marmora; and these quarries are still worked for Constantinople; and most likely this sea takes its name from being really a marble basin.

The produce of the quarries of Egypt brought down the Nile for Roman use may be called Mediterranean, the most valuable of which were those of imperial red Porphyry; these are now being re-worked, the first important consignment of 270 small blocks having this last month arrived in London, the remains of ancient working on some of these blocks being most interesting, showing that they not only wedged, scabbled, and chiselled, as is now done, but that they even sawed blocks of this hard material asunder.

The Breche Verde of Egypt, the granites and oriental alabasters, were all extensively worked and floated down the Nile for shipment to Rome and other cities.

Ancient Numidia (now the eastern portion of Algeria and the west of Tunis), produced the Giallo Antico; these quarries are very extensive, the Romans having quarried right through the mountains; from here came the yellow monolith columns of the Pantheon in Rome, and those of the Arch of Trajan, now re-used in that of Constantine.

At a number of places along the Algerian coast are ancient quarries of rich coloured marbles, chiefly reds and yellows; from those of "Cape Chenoua," near the ancient Julia Cæsarea, the capital of Mauritania, was brought the rich red marble (rouge Etruscan) used for the decoration of the new rooms and staircase at the National Gallery, London. Further west, at Kleber, near Oran, there are the famous quarries of Sig. Del Monto; these marbles are unquestionably the richest (as regards reds and breccias of red, yellow, and browns) that have ever been discovered in any part of the world; they are now largely used in America. The Algerian onyx marbles are found near Oran, and red ones have recently been discovered at Guelma, in the west of Algiers. The Mediterranean coast of Spain for thirty miles inland abounds with marbles of every colour.

There is first the sparkling crystalline statuary of Macael with which the Alhambra was built, the rosy veined of Tarragona, the rich Broccatellos and jaspers of Tortosa, the red and orange blended Brocatellos and onyx of Malaga, the Griotte deep reds, blue Turquin and fossil of Gevona; also the precious green Serpentine of Granada, which has scarcely a rival in richness of colour and firmness of texture. Many of these were worked by the early Romans and Moors.

On the French Coast are quarried a number of deep and light reds and brecciated yellow.

The ancient quarries of Luni, now Carrara, are at the present day the most renowned in the world, and considered, with the adjoining ones of Massa and Seravezza, to cover an area of 27 square miles. The marble rocks commence a little above the sea-level, and extend up the mountain to an altitude of 7,000 ft., the whole of the sides and valleys of these mountains being studded with innumerable quarries, giving employment to 15,000 people, the result of whose labour supplies probably 90 per cent. of the white marbles used in the world.

These quarries were known and worked by the Romans, and have been worked continuously since before Christ, but the immense development has taken place within the last fifty years, or we might even say the last thirty years.

Probably no single individual has visited the whole of these quarries, not even interested residents. To see and examine them all would take an entire season.

The most valuable marbles of the Appenine range are those of Mont Altissimo, at Seravezza, situated at an altitude of 7,000 ft.; here the most beautiful and durable statuary is found in immense beds, masses being extracted of the purest quality containing thousands of feet cube, the value per foot being 2*l*., or even more; single blocks worth 500*l*. each are often obtained, and occasionally up to 1,000*l*. This marvellous mountain of Altissimo produces also a statuary grained marble of blueish tint, nearly the whole of which is sent to France for statuary purposes, as it is extremely durable for exterior work. The famous coloured breccias of grey, red, and purple, the Rhondona, Toir de Perchia, and others, are found here in large masses, also the blue-veined Bardilio and a Cipollino. The promontory of the Gulf of Spezzia (Porto Venere) is one massive rock of black and gold marble. Near Genoa are the quarries of Green serpentinous limestone; the one containing red spots is called in commerce Egyptian.

Similar marbles are found in Corsica, also the purple-veined (Fior de Persico), and a rich mixed green and amethyst coloured granite used largely in the Medici Chapel at Florence; the orbicular granite (Napoleonite) is also obtained from this island.

Between Sienna and the coast there are the rich quarries of Sienna yellow (this beautiful marble is not found in ancient Rome).

At Voltera, near this coast, is obtained the pure white Italian alabaster; and at Prato, the deep olive-green serpentine used so extensively at Pisa and Florence.

At Mount Rommola, near the coast, are ancient quarries of statuary white.

Sicily contains several good marbles. Near Trappini, on the west, the choice jaspar marble is obtained, also the rich coloured silecous jaspars.

At Tauromena are quarries of reds and browns.

The rocks of Brindisi and those of the opposite Adriatic coast, up to Istria, are a fine-grained white limestone; this is the stone with which the Venice palaces are built, the white sort being the Palambino, found in Mosaic pavements. East of Trieste a useful red marble, like the Brocatello of Verona, is worked very extensively.

I hope, in conclusion, this short but very imperfect summary may give some idea of the money wealth in the Mediterranean rocks.

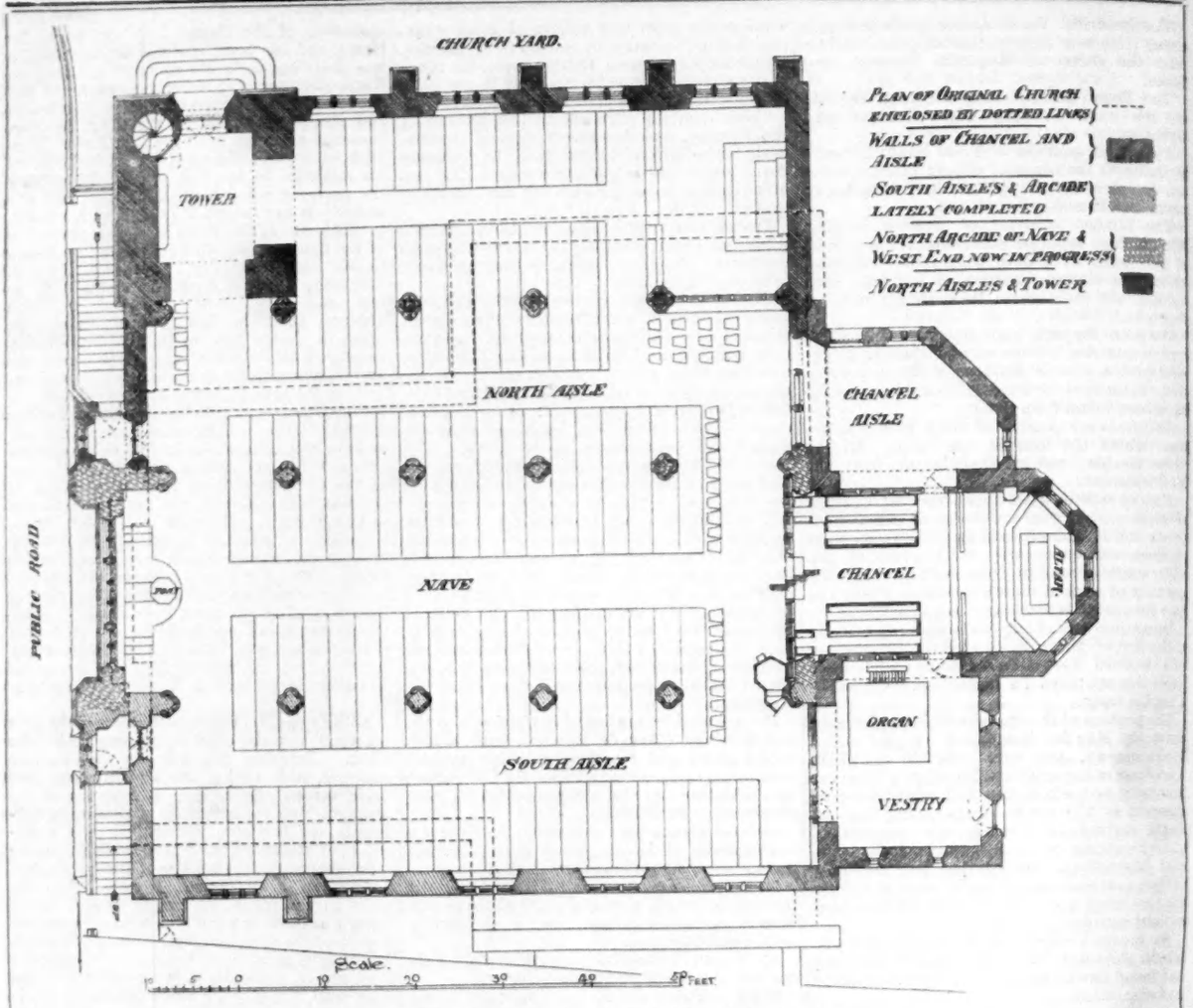
ARCHITECTURAL ASSOCIATION VACATION VISITS:

KNOLE HOUSE.

THE fifth vacation visit was made on Saturday last to Knole House, the seat of Lord Sackville, when a party of over thirty members visited this remarkably fine and interesting Elizabethan and Jacobean mansion. Knole appears to have been a notable manor-house from very early times, and for a considerable period was associated with the Archbishops of Canterbury, by whom it was used as a country seat, together with their palace at Otford. Knole was bought for 400 marks by Thomas Bourchier, Archbishop of Canterbury, in 1456, from William, Lord Saye and Sele, the son of the Lord Treasurer, who perished in the insurrection of Jack Cade. Archbishop Bourchier rebuilt the house and enclosed the park, and possibly some of the ruins which are situated to the east of the mansion may have formed part of Bourchier's work, besides what remains of it in the present building. Archbishop Morton, successor to Bourchier, enlarged the house and received there as guest King Henry VII. Henry Dean and William Warham, successors to Morton, resided occasionally at Knole, Warham in particular having there several times entertained Henry VIII. In the days of his successor, Cranmer, however, the spoliation of the Church had been begun by Henry and his courtiers, and the Archbishop was therefore under the necessity of giving up Knole together with other possessions of the See in order to save the remainder. The house and manor belonging to the King, he then bestowed them on John Dudley, Earl of Warwick, afterwards Duke of Northumberland; on his attainder in the first year of Queen Mary the property reverted to the Crown, and she granted it to Cardinal Pole, and at his death, in 1558, it again came into the possession of the Crown. Elizabeth presented the Manor to Sir Robert Dudley, afterwards Earl of Leicester, but he again surrendered it to her and she then bestowed it upon Thomas Sackville, first Earl of Dorset, who came to reside here in 1603, and constantly employed two hundred men upon alterations and repairs until his death in 1608; it is, therefore, in the highest degree probable that it was during these years that the greater part of the existing features of the house were carried out, and the character of the work would certainly bear out this assumption. For a time, owing to the extravagance of Richard, grandson of the first Earl of Dorset, the property was sold to Henry Smith, Alderman of London, whose benefactions to various parishes in the counties of Kent and Surrey are of a very considerable extent. By his trustees, however, the property was again sold to Richard Sackville, Earl of Dorset, nephew to the former, in 1661, since which time it has continued in the possession of his descendants. The present title of Baron Sackville was revived in 1876 in favour of Mortimer Sackville-West, brother of the present Peer.

Architecturally, the main features of the plan are the two great quadrangles, one behind the other. Entering the first by the carriage entrance, and noting the horn lanterns and silver maces, one receives a foretaste of the distinguishing characteristic of Knole, its richness in old furniture, decorations, and accessories of Jacobean and later periods. In the outer quadrangle are replicas of ancient statues, a gladiator and a Venus, *orta mari*. From the outer to the inner quadrangle the entrance is below a massive tower which forms the central feature of the principal front of the outer court. Fronting us as we enter the inner quadrangle is a colonnade, evidently a later addition to the outer wall, and through this we enter the house and reach the great hall, still the important feature of the interior, whose dimensions are 74 ft. 10 in. in length, 27 ft. in width, and 26 ft. 8 in. in height.

The screen through which we enter, and the minstrel-gallery over, decorated with the arms of the first Earl of Dorset and his Countess, is a good example of the Jacobean treatment of this feature, but loses all charm by reason of its having been "painted four times in good oil colours, grained wainscot, and twice varnished," the wainscoting and other woodwork of the hall having shared the same fate. Even the fireplace has been "grained imitation marble," which, however, throws into stronger relief the high character of the beautiful workmanship of the fire-dogs, which, we are told, were brought from Hever. The principal staircase, one only of the sixty or eighty said to be in the house, has likewise suffered from the attentions of the eighteenth-century painter and decorator, which detracts much from one's enjoyment of the really pleasing design and arrangement of its planning. Remembering the effect of Hatfield, Audley End, and other houses of this period visited lately by the Association, it is pitiable to realise how much charm has been lost by the vagaries and vandalism of vehicle and varnish. In passing through the principal reception rooms, the richness of the house in fine pictures is especially noticed, as when we find, for example, that the Crimson Drawing Room is completely hung with works of Sir Joshua Reynolds, any one of which would make an ordinary man proud. Tapestry, too, of somewhat late date it is true, but exquisite in design, execution, and preservation, meets our view repeatedly, notably in King James' Room, and in the Chapel. The collection of ancient silver also, in King James' room and elsewhere in the house, is remarkable both for its design and its intrinsic value. The number of ebony and other carved cabinets would in themselves signalise many a museum of ordinary size, while ancient Oriental carpets and rugs, hangings and upholstery of costly embroidery, and other rare and valuable bric-à-brac, afforded the visitors a treat which



Lower Brixham Church.—Plan Showing Enlargements.

will not easily be surpassed. Even the attics, to which the party penetrated, proved a mine of wealth in decayed and decrepit specimens of household goods which form a veritable history of domestic furniture for the last three centuries. To the architect, the picture lover, and the enthusiast in bric-à-brac few of the stately homes of England offer greater attractions than Knole House, which through the generosity of the present Baron Sackville is once more open to the inspection of the curious,—at a florin a head.

Illustrations.

THE OLD BRIDGE AT PRAGUE.

THE old bridge at Prague, which has been so seriously (though, we trust, not irreparably) injured by the overflowing of the Moldau is, without doubt, one of the most valuable structures of its date and class in Europe. It is one of the very few, if not the only example, of an important fourteenth-century bridge with its towers and gates complete. In addition to this, this venerable bridge claims our attention upon other grounds. From an architectural point of view it is most valuable as being the work of one of the greatest Mediæval architects whose name has been handed down to our day.

There appears to be sufficient documentary evidence to establish the fact that when the Emperor Charles IV. commenced this bridge, in the year 1357, he appointed Peter Arler, of Gmünd, as his architect; there were two members of this family, brothers, who have left a great reputation — Peter and Henry. Peter erected the clearstory, transept, and lofty spire of the cathedral at Prague. The spire, which is said to have been the highest ever erected, was destroyed by lightning in 1541. The Wenzel Chapel, attached to the Cathedral, the Rath-Haus at Prague, the churches at Kolm, Brun, and Nordligen are also attributed to Peter Arler. Henry became still more famous; he erected the magnificent church of Holy Cross at Gmünd and, under the Italian appellation of "Enrico di Gamodia," furnished the plans for the Cathedral of Milan.

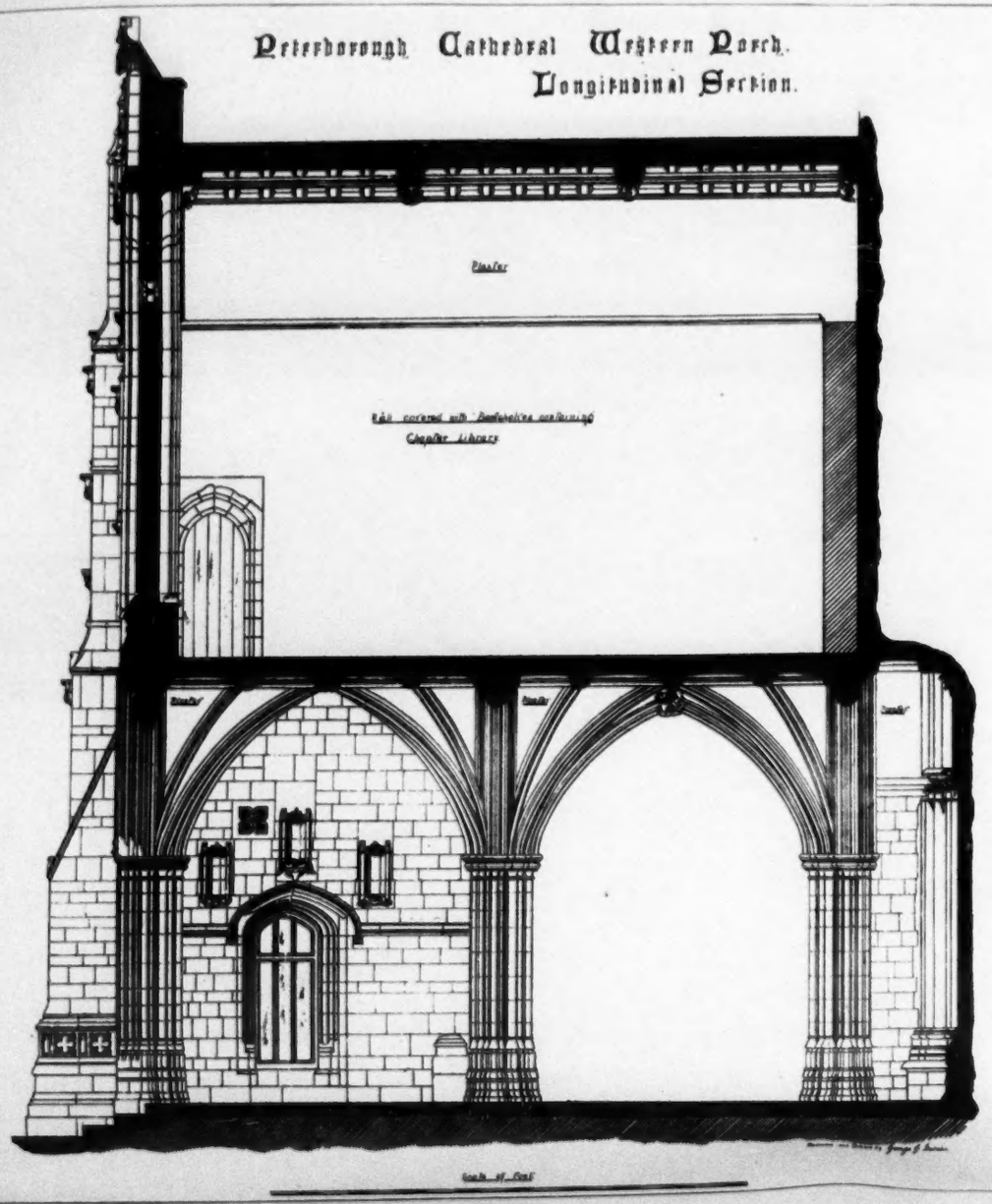
The bridge at Prague appears to have been carried on slowly, even for a Mediæval work. The beautiful tower of the Altstadt, called the "Albstädter Brückenthurm," which is shown in our view, was not completed until 1451, and the bridge itself was not entirely finished until 1503. There can, however, be no doubt that the bridge was in use long before that time, as John Nepomucine was thrown from the parapet into the water in the year 1383. The great monuments which stand upon the piers of this bridge are, with one exception, comparatively modern; that exception is the so-called "Old Memorial Column" (Alten Denksaule), which is adorned with Gothic panelling and angels holding shields, and on the summit is the statue of a knight in full armour, whose head and shoulders have unfortunately disappeared. A large group, representing the Crucifixion, was erected in 1668, and the bronze statue of St. John Nepomucine, the only really valuable piece of sculpture on the bridge (with the exception of that attached to the Altstadt Tower), in 1683. The bridge itself is 1,572 ft. long, 33 ft. broad between the parapets, and, at its highest point, 42 ft. above the water-mark when the river is in its normal condition. The widest arch is said to be 69 ft. span, but this may be doubted; it certainly does not look anything like so much. As in all ancient bridges, the piers are immense in proportion to the span of the arches. There are sixteen of the latter, though they do not all cross the water, as there is an island which intervenes between the two banks. The bridge is not straight in plan, but makes two deflections—one very slightly to the south just beyond the third arch from the east end, and the other very decidedly to the north. It is not easy to account for this peculiarity; it may have arisen over some difficulty in the foundations of the piers. The tower, which is shown in the foreground of our view, stands upon a great pier between the first and second arches; it is an exceedingly fine piece of design, and is, in all probability, for the greater part, the work of Peter Arler, because the cognizance of the Emperor Charles IV., the bear, is represented upon the finial of the canopy over the archway, and that emperor himself is portrayed as standing upon a pier between two arches of the bridge.

It is very rarely that one finds a Mediæval example of military architecture so elaborate as to its detail. Yet not only was it intended for purposes of defence, but it has borne a very important part in the constant battles of which Prague was the scene during the fifteenth, sixteenth, and seventeenth centuries, and as late as 1648 the Swedish army battered and besieged this gate for six weeks, which accounts for the fact that the front towards the bridge has been deprived of all its decorative features, whereas that towards the Altstadt is, as shown in our view, very rich and elaborate. The gateway leading to the "Kleinseite," is quite different in design; it consists of an embattled portal, flanked by towers of different height. It is far plainer than the Altstadt Gate, though its bracketed turrets and upper story are adorned with well-designed arcades and niches.

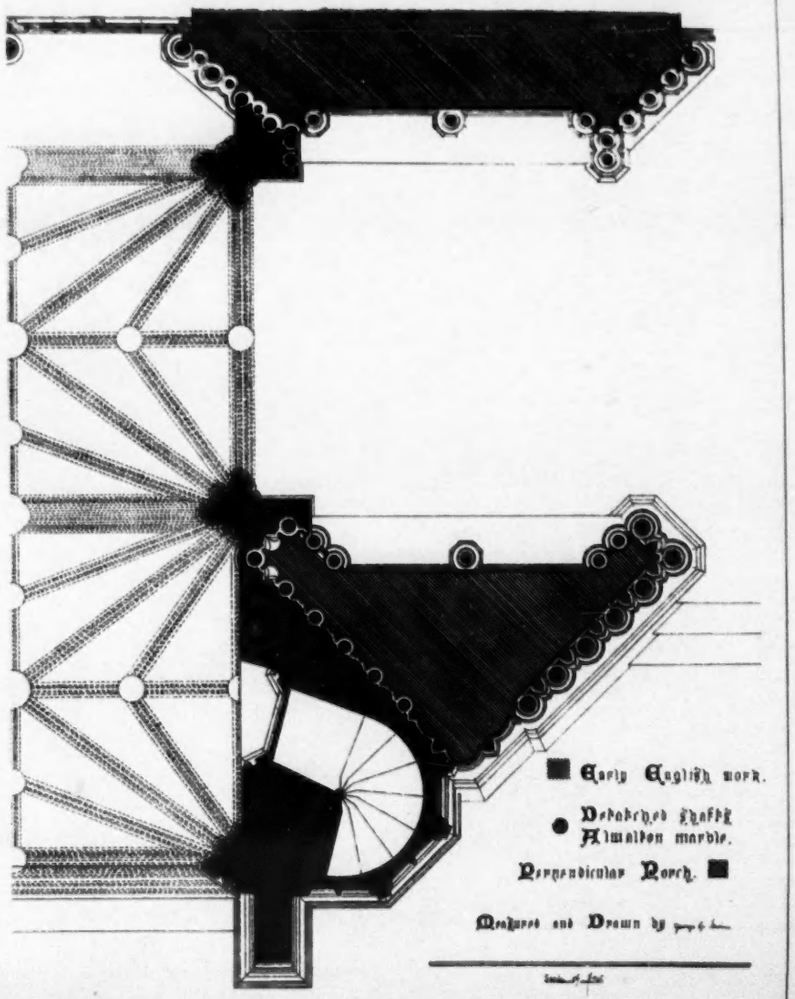
It is not very easy, at present, to say exactly what damage has been done to the bridge by the recent floods. Accounts are contradictory, and until some competent authority has examined it it is impossible to say what repairs are rendered necessary, and how much of the structure will have to be taken down and rebuilt. We trust, however, that the Austrian Government will take such steps as are necessary to save as much of the old bridge as is possible, and will immediately commence such engineering works in connection with the river itself, as will prevent the recurrence of a calamity which

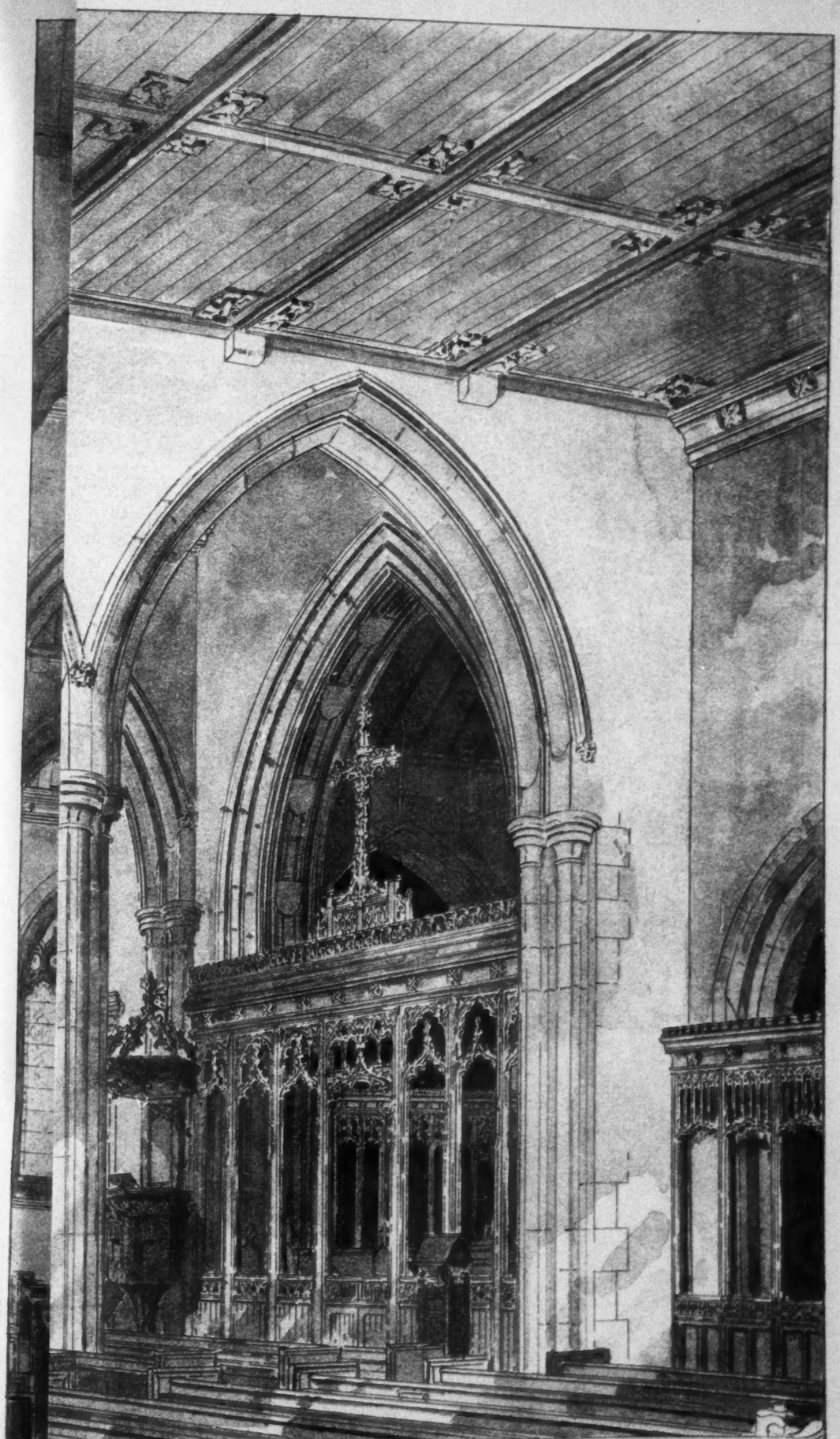
Peterborough Cathedral Western Porch.

Longitudinal Section.



Western Porch Plan





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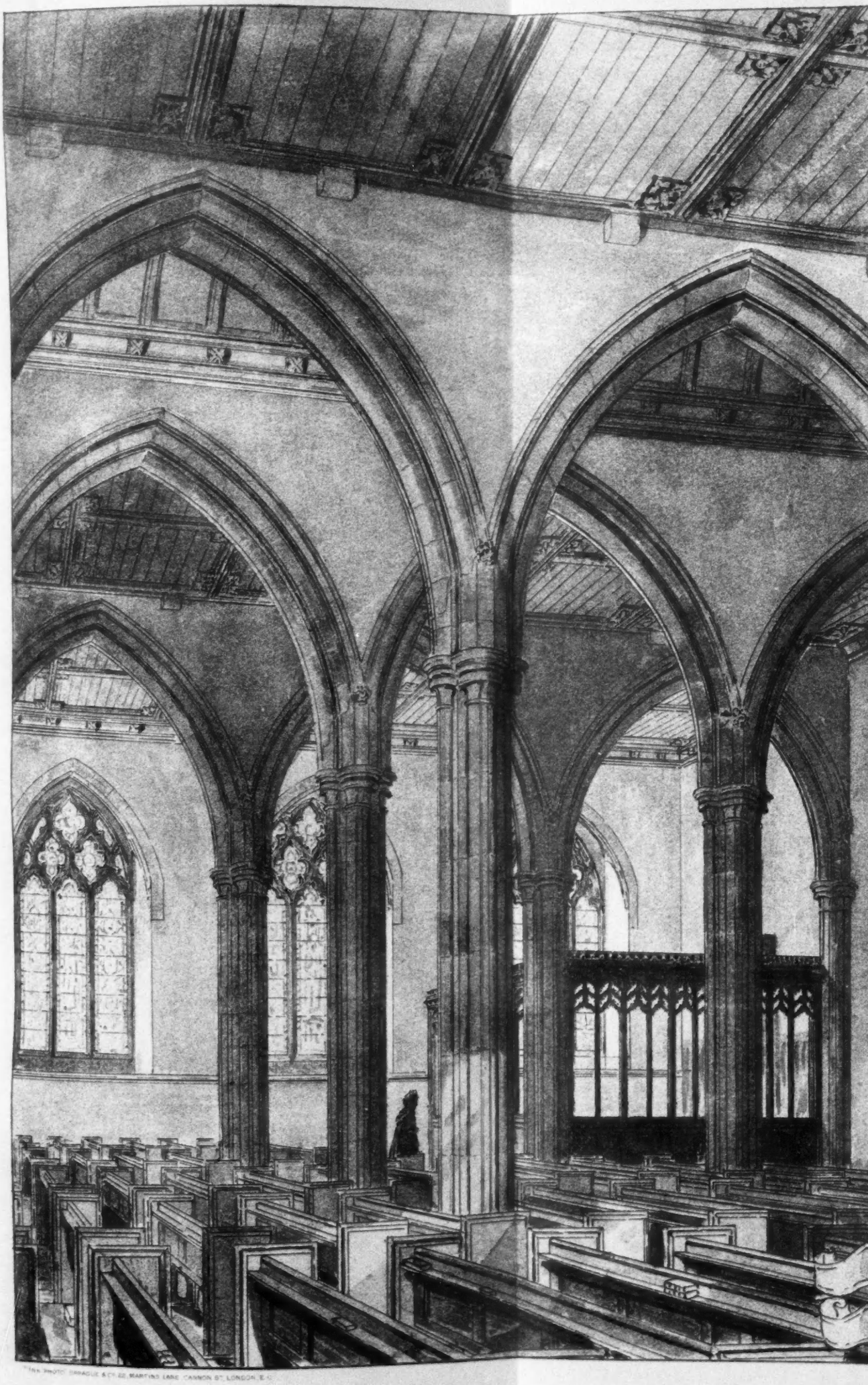

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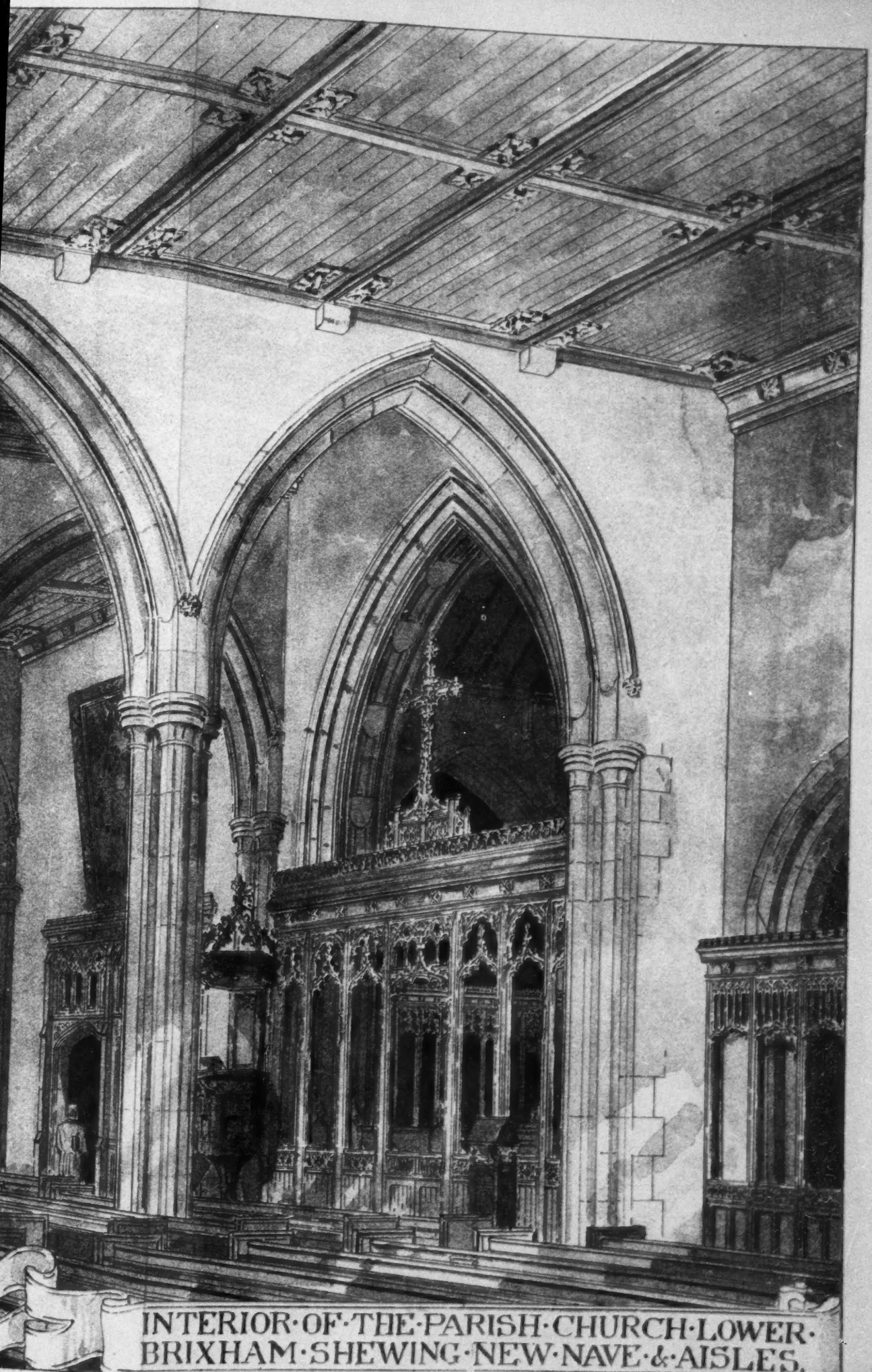

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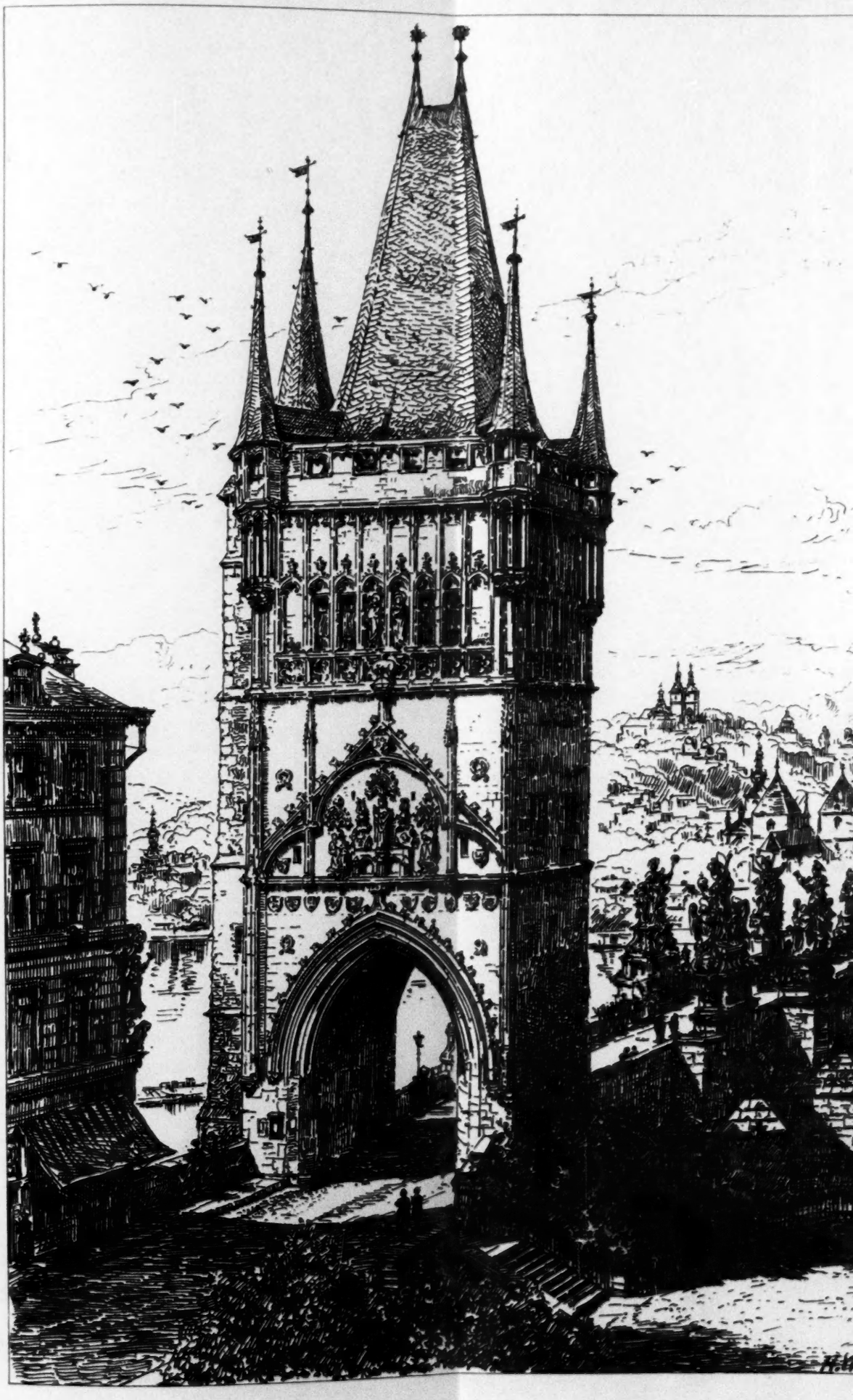


THE OLD BRIDGE AT PRAGUE: PARTIALLY DE

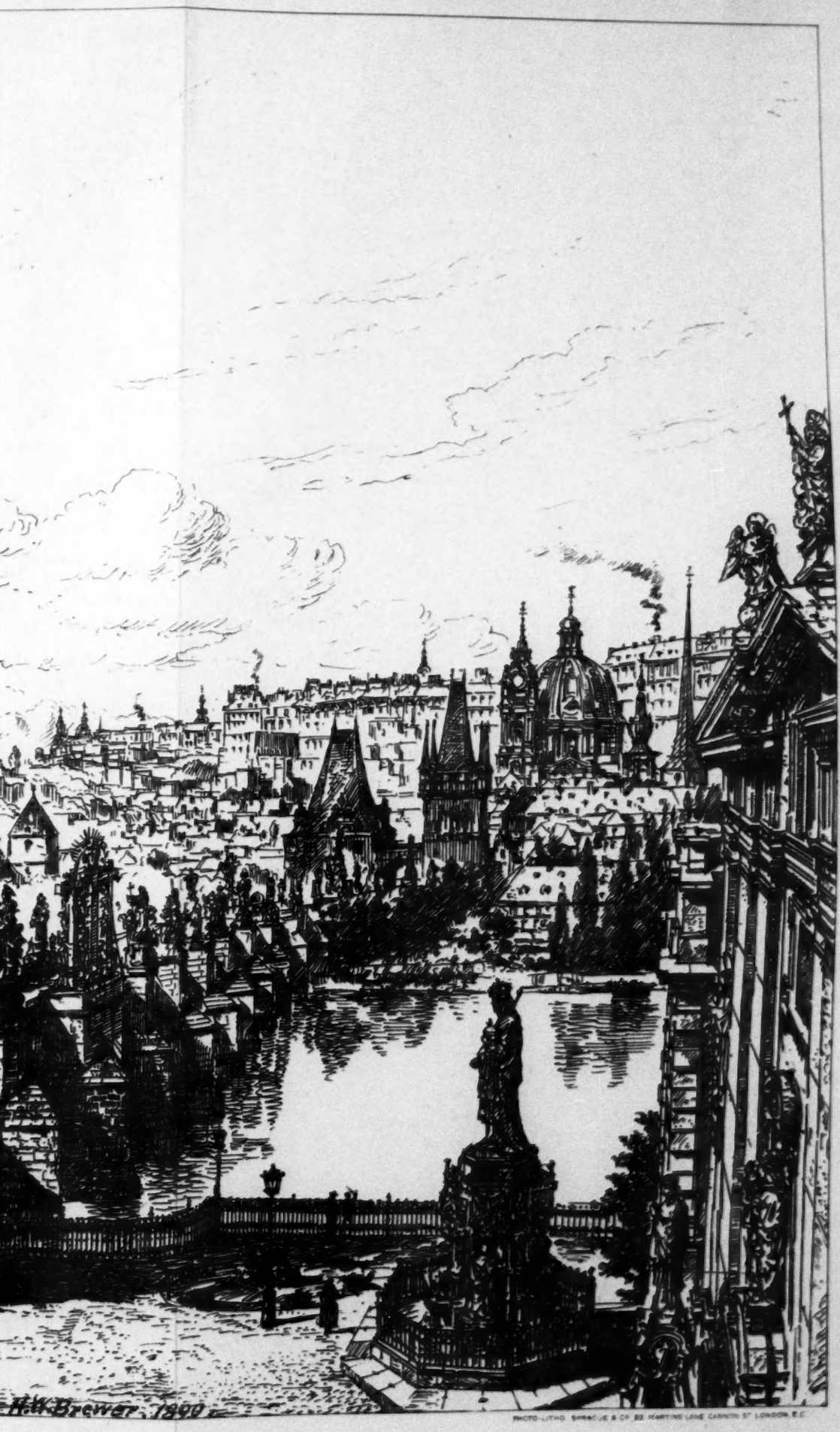
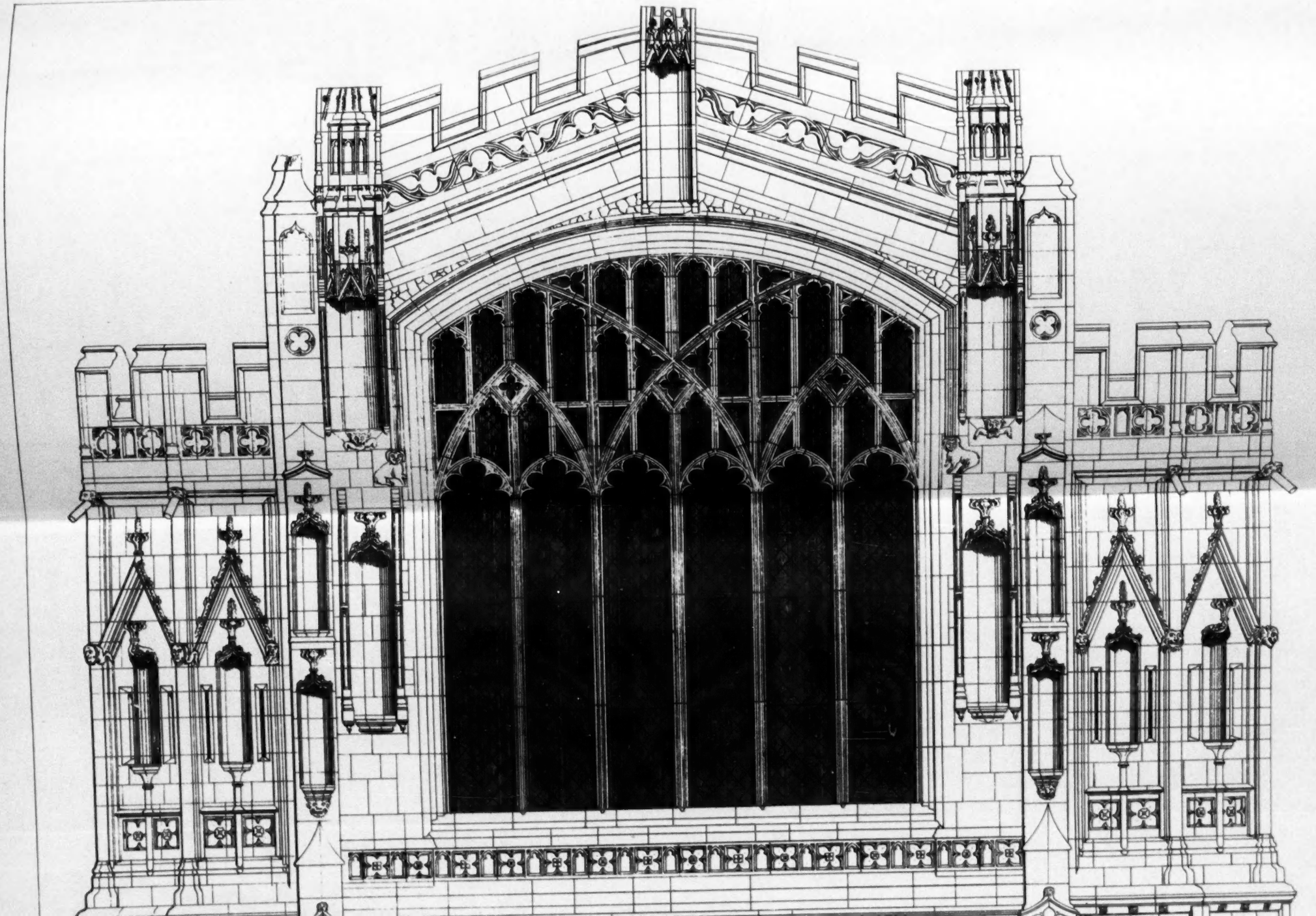


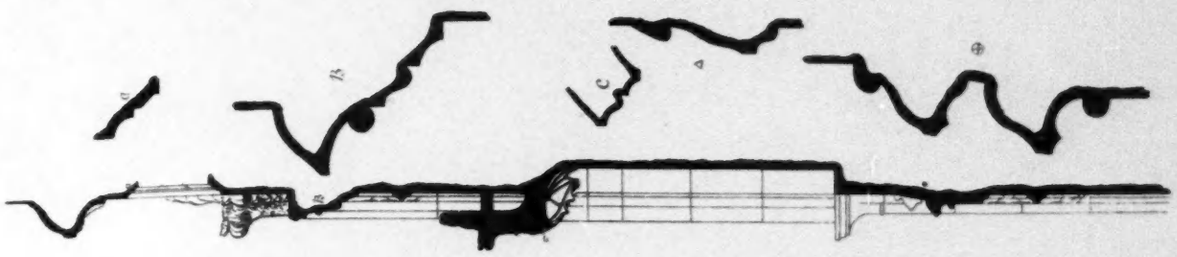
PHOTO-LITHO. SPRAGUE & CO. 22 MARTINS LANE CANNON ST. LONDON E.C.

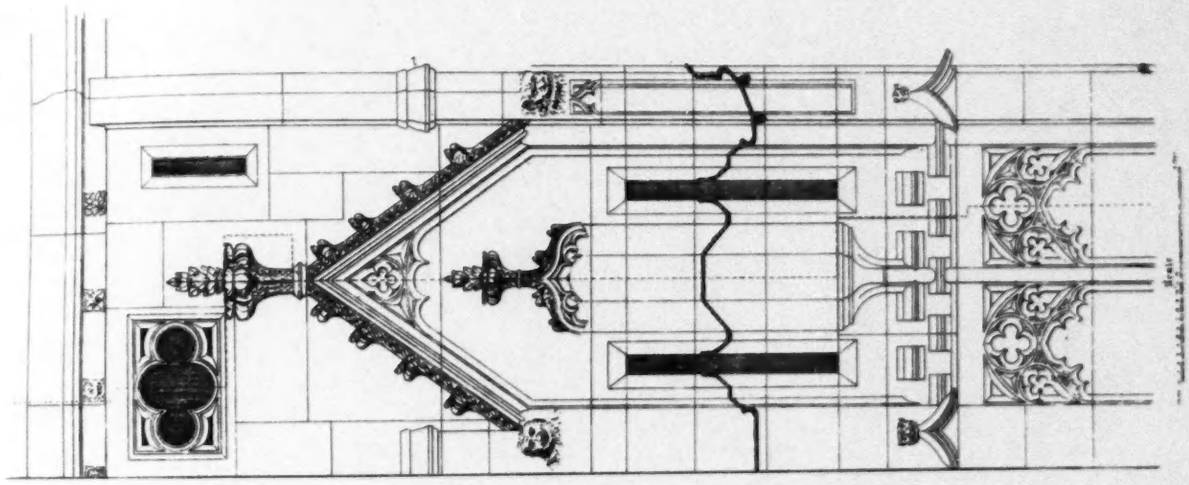
LY DESTROYED BY THE RECENT FLOODS.



PORCH, WEST FRONT, PETERBOROUGH CATHEDRAL.—Measured and Drawn by Mr. G. G. Irvine.

FRONT ELEVATION.

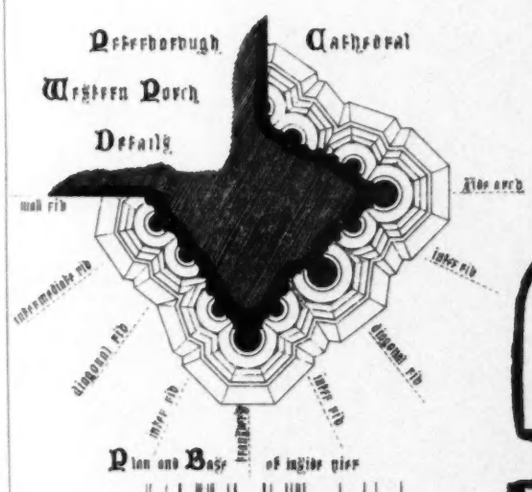




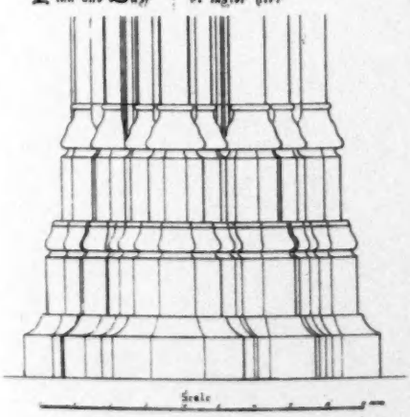
Peterborough Cathedral

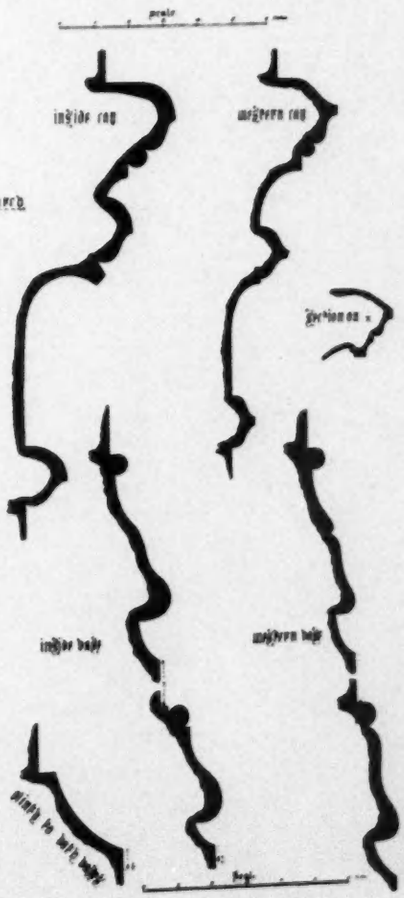
Western Porch

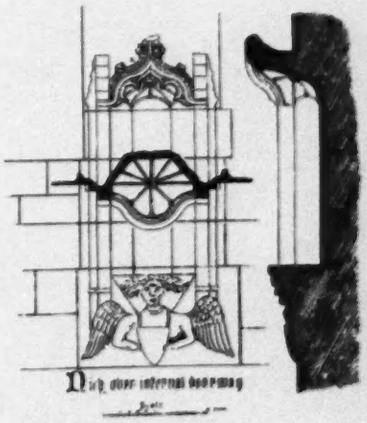
Details



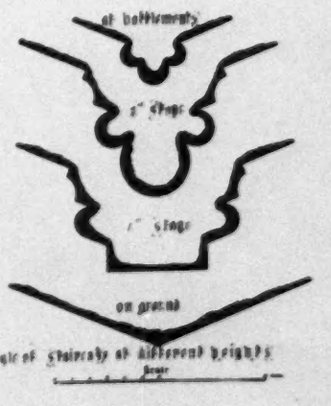
Plan and Base of inside pier







Plan over internal doorway



angle of staircase at different heights

Measured and Drawn by G. G. Irvine.

PHOTO-LITHO. SPRAGUE & CO. 32, MARTINS LANE CANNON ST. LONDON, E.C.

has caused so much destruction all over Bohemia.

We should mention that our view, in addition to the bridge, shows the Church of St. Francis, immediately to the right, which, although founded in the thirteenth century, was entirely rebuilt in 1672; in front of this stands the modern statue and monument to the great Bohemian emperor, Charles IV. On the opposite side of the river are seen the part of Prague called the Kleinseite, or "Little side," and rising above it is the "Hradschein," crowned by the palace of the emperor and the houses of the Austrian and Bohemian nobility. The great dome-crowned church is that of St. Nicholas in the Kleinseite, originally built in 1283; it was rebuilt from 1673 to 1774. To the right of which is seen the thin spire of the Church of St. Thomas,—a thirteenth-century building, but completeiy modernised; and to the left, over the bridge, rise the stunted towers of the Church of the Knights of Malta, rebuilt in the year 1503. On the top of the hill, to the right, are the spires of the Premonstratensian Priory of Strahow, the church of which is a very plain Romanesque building, commenced in 1140. It contains a fine organ with fifty stops and 3,177 pipes. The library of this monastery,—the most ancient in Prague,—contains 50,000 volumes: attached to it is a large picture gallery and a hospital. Crowning the hill to the left, called "Laurenz Berg," are the twin spires of the Church of St. Lawrence; but, as this has been taken possession of by the military authorities, it is closed to the public, and the writer was unable to inspect it, which is to be regretted, because the chapels attached to it are adorned with a series of pictures by Furich, which are said to be fine examples of the modern German school of religious painting. The more interesting old churches of Prague—the cathedral, the "Tein Kirche" (the chief Bohemian Church), and the Benedictine Church of "Kloster Emmaus"—lie out of the range of this view.

H. W. BREWER.

ALL SAINTS' CHURCH, LOWER BRIXHAM.

EARLY in this century the increase of population made it desirable to separate the old parish of Brixham, and to serve the "trawlers," a rectangular box, some 75 ft. long and 40 ft. wide, was constructed in Lower Brixham. This was covered in with a queen-post roof, and ceiled flat at the level of the ties, about 27 ft. from the floor.

This building was enlarged by transeptal projections, with two stories of galleries, and is shown on the plan by the dotted lines. About twenty years ago, a mean little chancel with aisles was constructed.

The site selected for the church falls so rapidly from the chancel to the end of the nave that, whilst the floor of the latter is 10 ft. above the road outside, the eaves of the former are level with the surface of the hill.

It was determined in 1883 to rebuild the nave, but to retain as far as possible the number of seats given in the old church and galleries. It being impossible to burrow further into the hill-side, or to lengthen the nave by encroaching on the road, the necessary floor space had to be got laterally. The funds in hand did not admit of the work being carried out at one time, and it has consequently been necessary so to plan the work that the old building should be left and used in conjunction with the new. The first work was the construction of the south arcade, and when the roof was supported by it, the old outside wall was pulled down, and a new one built, completing the south aisle of the future church. This aisle is constructed of local blue limestone from Berry Head. The arcade and other internal stonework are of Ham-hill stone, the window tracery and other stone on the exterior are from the Doulting quarries. The aisle thus formed is 18 ft. 3 in. wide clear internal measurement, and 75 ft. long and about 27 ft. high. The roof is of iron joists and concrete by Drake & Co., covered with Claridge's asphalte. The concrete is ceiled underneath with boarding and moulded ribs.

The work now to be undertaken is the construction of the north arcade of the nave, still leaving the old queen-post roof, which will not be removed until later on. The west wall, suited to the pitch of the intended nave roof, is also now to be taken in hand. This contains a seven-light window with flowing Decorated tracery.

The north wall of the old church will still be left standing, as there are not sufficient funds in hand to admit of the aisles being finished at once.

When the nave is roofed the existing chancel arch,—a very lean and unsatisfactory work,—will be masked by a new wall and arch, which will carry the gable end of the nave roof.

The internal width of the church, when finished, will be 84 ft. 9 in. by an average length of 75 ft.

The church is designed by Messrs. Somers Clarke & J. T. Micklethwaite, of Westminster.

PORCH, WEST FRONT, PETERBOROUGH CATHEDRAL.

THE unique design of the Cathedral front is too well known to require much explanation. It is the *supposed* work of Abbot Acharius or Zachary, 1200-1210 (prior of St. Alban's during part period of the erection of John de Cella's front there). The plan presents features much akin to those of the foundations Sir George Gilbert Scott laid open at St. Albans'. Peterborough front, when close to completion, underwent both reduction of height and considerable change in design. Its great piers are supplied abundantly with delicate shafts of local "Alwalton marble," obtained from the property of the Monastery, at a village of that name on the south bank of the Nene, in Huntingdonshire. (It is somewhat lighter, but perhaps more durable than Purbeck.) The pillars are triangular in plan, with the point to the front. Of their courses scarcely one can be found to be entirely of a single depth or layer of stone; they are in fact *random ashlar*, differing from all else in the church, and suggesting that the masons were limited to dealing merely with older re-used materials. The natural settlement of such work soon produced that tendency outwards of the upper part of the front, which portends its eventual destruction. So serious had this become at the close of the Decorated period, that the Monastic body procured the original of the design afterwards erected as here drawn, but which the Abbots appear to have delayed as long as they possibly could. Hence the earlier design appears in Perpendicular clothing, though the peculiar gablets of the first style are to be discerned on the stair turrets, and the architectural student may otherwise find interesting study of this conflict in the earlier sections of the caps of the vaulting shafts of the inner bay, with those of the outer shafts of the west arch. The top of what is now left of the pinnacle over the apex of the gable, retains part of the hollow prepared for a lamp to be placed in at night.

The following entry appears to refer to the space under the open arches, prior to the erection of the porch:—

"In 1347, Simon de Sapcot, executor of the last will of John de Blakketort, of Walcot, in the parish of Bernak, gave his best horse as" (or in payment for) "a mortuary in the place called Galilee (*in loco qui dicitur Galiley*)." Reg.: Fraunceys, p. 219.

The very beautiful ironwork filling in the west arch of the porch is not older than about the year 1792, when the following entry in the audit-book of the Chapter occurs, but without any further notice of designer or place of manufacture:—"3rd day July, 1792. It is also agreed that the timber now standing upon our estates at Thorpe, on lease to the Earl Fitz William, be sold in order to pay the expense of the new ironwork in the Minster porch."

G. G. IRVINE.

ANCIENT BRITISH ROADS AND EARTHWORKS.

AT the recent congress of the British Archæological Association, held at Oxford, Dr. Phené, F.S.A., read a paper "On some striking Historical and Linguistic Features, belonging to the first 1,000 years of British History, and attaching to the Vicinity of the British Roads and Earthworks." Dr. Phéne pointed out that in all the literary descriptions of the ancient and pre-Roman roads of Britain, there were two important omissions, one as to locality, the other as to language. That he had discovered the absence of such information in long practical researches as well as in the localities, in comparative linguistic derivations.

The description given by Cæsar of the inhabitants of Britain was as true a picture now as it was when he recorded it, viz., that the maritime people were polished, as being well acquainted with other nations in traffic, and the pastoral people uncultivated.

Though the Anglo-Saxon race now occupied the greater portion of the land, some of the Gallic people (*i.e.*, the pastoral) still occupied the north-western coasts, mountains, and islands.

These latter were just as Cæsar described them, as to their unmaritime dispositions, and the press, and great men of the North-West, as the Marquis of Lorne, urged their attention to the people of the East coast, (*i.e.*) maritime loving people, as good examples to follow, on many points.

In short, though the numerical proportion now differed widely, the population might be divided into those engaged in some way in or for maritime matters, as manufacture for transport, &c., and the land-loving people of Keltic descent.

He then examined the localities of the great pre-Roman roads of traffic. The Icknield Way from west to east, and the Watling and Ermine Streets from south to north, along the eastern coast.

It was shown that although modern names and meanings had succeeded many of the ancient ones both in English and in Scandinavian, yet that most curious linguistic features still existed along these routes, distinct from other localities, and that a class of words abounding in Cornwall, and found slightly at intervals along these roads, were as abundant in what was once the country of the Iceni,—*i.e.*, on the coast of the North Sea,—as they were on the south-western coast; that not only were they abundant at the two extremities of the ancient Icknield Way, but that where, from the names of the places, there was evidence of any locality having been specially marked, either as a resting-place, or as a place of reverence or worship, there they also abounded, though in a less degree.

Quoting from Cæsar, Strabo, Tactitus, Florus, Quintilian, &c., it was shown that the Continent must have had similar ancient roads—as Cæsar enumerates many bridges over many rivers—and that from the large concourse of merchants he summoned, the commercial feature must have been powerful before Britain was invaded by him, and hence that the British ways must have been in use for traffic; that the names and words referred to showed extensive intercourse throughout these districts, and extended along the east coast up to the Humber, and even farther north; that by a curious mutation of the B and W, letters mutative in ancient and modern Greek, in ancient and modern Welsh, &c., the same names and words, though existing unaltered at these extremities and stations on these roads, abounded also in the same proportion, or nearly so, with the mutative initial changed, and that this appeared to arise not merely from the letters being mutative, but from the custom of the Scandinavians of placing a letter or syllable as a prefix, to indicate their localisation to the east or west, as is prominent in the words Visi or Western Goths, Ostro or Eastern Goths, and that consequently the W, and sometimes the U, was placed less as a mutative letter than as indicative of locality; and that the Iceni, when in the west, were known as the Wiccii, and sometimes as the Uiccii, which latter word was aspirated.

The localities of rest, and also of worship, were found in every case in the vicinity of the great chalk-cut figures along these ancient roads, and their intersecting roads, as identified by the names still existing in their localities, and the clustering around them of names and words which only sparsely existed along the mere lines of route, as Is-lip, near Oxford, Is-ham, in Leicestershire, Is-ton (though corruptly aspirated), near Cambridge, Is-field, in Sussex, Is-leham, in Essex, Is-lington, in Middlesex and in Norfolk, Is-leworth, &c. This word, always in low-lying districts, was simply the old Norske word, "is" (ice), which became an important feature in their winter warfare and their winter traffic, and as recorded, *inter alia*, by the attack on Ely by the Barons opposed to King John was the sole means of their victory.

Again, Ris-borough, near Oxford, was found along these routes, as Ris-ingho (ho being Scandinavian for hill), Ris-by, Ris-bury, Ris-ley, Ris-burgh, Ris-hanles, &c. This word Ris is old Norske for hall of hospitality in the word "guest-ris-inn." And the Ris-borough near Oxford, that is at the village of White-*Leaf*, is further shown to be the place of rest on this route, not only from its being midway in the Icknield road, but from the name itself—"*lief*"

and "*leif*," spelled by us leaf, being the old Norske for rest, remainder, &c.

Several curious and interesting words were dealt with, as Gamlingay, Warmingay, and Belingay, all places of worship, around which clustered other words, not British, Roman, or Saxon, but Scandinavian.

It was further shown that the most remarkable events in ancient British history had taken place in the localities indicated by the nomenclature referred to. The first battles which subdued Britain to the Romans, Saxons, and Normans having been fought in the sacred territory of Anderida, a name that occurs *solely* in Phœnician routes of traffic as Androna Andropalis, Anderitum, Anderitium, Andros, &c.; that near Hoke-Norton (Högg-Ormur), close to Oxford, are the Roll-rich stones, where Rollo, conqueror of Normandy, with the Northmen, persistently held the country by obtaining decisive victories over the English; that the Norman conquerer William, when in contest with the Barons, again raised his standard on one of these ancient camps, near Hoggington (Högg-Ormur, near Cambridge), in the former district of the Iceni, indicating its then still existing importance; that the Romans had to contend with a people from Scandinavia, against whom they established a special guard on the coast, and in Anderida in particular; and that the nomenclature and traffic strongly indicated a pre-Roman-Scandinavian occupation of South and East Britain.

ARCHÆOLOGICAL SOCIETIES.

ESSEX ARCHÆOLOGICAL SOCIETY. — The annual general meeting of this Society was held at Harwich on the 28th ult., being preceded by a gathering at Ipswich on the previous day, in union with members of the Suffolk Institute of Archæology. At the conclusion of the general business, the Rev. H. T. Armfield, M.A., F.S.A., read an able paper "On some ancient boulders scattered in the district of the Colnes." In the afternoon an excursion was made to various churches, that of St. Nicholas being first visited. Dover-court Church, and Wix, Ramsey, and Great and Little Oakley were also included in the excursion.

SOMERSETSHIRE ARCHÆOLOGICAL SOCIETY. —The forty-second annual meeting of the Somersetshire Archæological and Natural History Society was held on the 27th ult. at Castle Cary. In the absence of the President, Mr. George Fownes Luttrell, the chair at the Council meeting, which took place in the Town-hall, was occupied by Mr. Chisholm Batten, who, having briefly opened the meeting, proposed the election of Mr. Henry Hobhouse, M.P., as President for the ensuing year. This was agreed to, and Mr. Hobhouse then took the chair. The Hon. Secretary (the Rev. J. A. Bennett) then read the report of the Council for the year, which stated that the number of members was steadily maintained. The MS. collections of the late Rev. Frederick Brown had been deposited in the museum, and would be known as the Brown collection. The subject of the formation of local branches of the society had been dealt with by a Committee, and rules circulated for the guidance of local societies. One branch, called the Northern, had been established within the district comprised in the petty sessional division of Long Ashton. The report having been adopted, the President delivered his opening address, which was of much interest. On the second day, the 28th, excursions took place to Lyte's Cary, West Camel Church, Queen Camel Church, Sparkford Hill Quarry, Hazelgrove House and Park; and on Friday, South Cadbury and North Cadbury House and Church were visited. The proceedings were reported at considerable length in the *Bristol Times and Mirror* of the 28th, 29th, and 30th of August.

ROYAL SOCIETY OF ANTIQUARIES OF IRELAND.—The Ulster quarterly meeting of this Society was held on the 2nd inst. in the Town-hall, Strabane. Among the papers read was one by Mr. S. F. Milligan, on "The Forts of Erin from the Firbolgs to the Normans." A long report appeared in the *Belfast Newsletter* of the 3rd inst.

NEWBURY DISTRICT FIELD CLUB.—This Club had recently a pleasant excursion to Aldermaston, Ufton, and Silchester. Aldermaston House was visited by permission of Mr. Higford Higford. The antique carved staircase, removed from the old mansion after the destructive fire forty-seven years ago, attracted much attention, as did some old stained glass showing the armorial bearings of some of the families which have held the manor. Aldermaston Church was visited, under the guidance of the Rev. J. M. Guilding, who called attention to the Forster Tomb, the Jacobean pulpit, and the old glass. Mr. Walter Money, F.S.A., hon. sec. of the Club, read an interesting paper descriptive of the mansion, and of the descent of the Manor. Ufton Court was next visited, by the permission of Captain and Miss Sharp, and here the party were met by Mr. W. A. Boulnois, who pointed out some of the most noteworthy architectural features. The hall ceiling was, he remarked, a good example of the kind of plaster work introduced into England after the Renaissance in Italy, and subsequent to the reign of Elizabeth. The house as it now stood dated from between 1610 and 1680, but the Gothic of the earlier building was imitated, and a good deal of the material used. Fortunately Ufton Court had fallen into most appreciative hands. Proceeding to Silchester, the party visited the excavations now in progress there, Mr. G. E. Fox, Mr. Mill Stephenson, and Mr. W. H. St. John Hope acting as *ciceroni* and explaining the remains recently brought to light. Mr. St. John Hope, in the course of his remarks, said they were dealing not with a camp or a villa, but with a large city, with an area of 100 acres. The wall was as nearly as possible perfect in its ring all round, though the facing was gone, except in a few places. The city was divided into blocks or *insulæ*, and one of the questions to be solved was what these blocks contained. Were there shops facing the lines of streets, or did the *insulæ* contain the remains of large residences or temples? That question had not been answered either at Silchester or at any Roman site in Britain. Other Roman sites had been built over, but at Silchester there was an opportunity of investigating the whole area. When, however, it was remembered that one *insula* was 400 ft. square, or larger than the site of some of our cathedrals, it became evident that the turning over and trenching was costly work. The Society of Antiquaries had made a handsome grant, and Dr. Freshfield, their treasurer, had undertaken the exploration of one *insula* at his own expense—they hoped others would follow his laudable example. Mr. St. John Hope concluded by describing the work at the *insula*. There were signs that at each corner were large houses with gardens, though the remains were very shattered. In the course of the discussion which followed, Mr. Money said it had always struck him as rather singular what had become of all the materials of such a vast city, but Mr. Guilding had, he believed, discovered that some of the materials had been employed in the construction of Reading Abbey, while he had himself discovered some Roman bonding tiles at Padworth Church. This led to the belief that for centuries the ruined city had been a quarry for materials for building churches and other structures. The party also visited other portions of the remains, including the amphitheatre, and the south and west gates. A long report of the meeting appeared in the *Reading Mercury* of the 6th inst.

Books.

Building Construction and Drawing. By CHARLES F. MITCHELL, Lecturer on Building Construction at the Polytechnic Institute. Part I., First Stage, or Elementary Course. London: B. T. Batsford. 1889.

THIS is the second and revised edition of a work previously noticed in these pages.* The author has corrected some of the blocks, and made some additions to the text, which include the examination paper of the Science and Art Department for 1889, with the questions arranged as exercises, in the order of their difficulty, on the subjects dealt with respectively in the chapters of the book. The additional matter amounts to some three pages, the body of the work being, with slight exceptions, page for page the same as in the first edition. Without wishing to find fault we must call attention to one or two points that might have claimed Mr. Mitchell's attention while the work of revision was in progress. For example, throughout the chapter on masonry, we find no warning against the practice of working stone to a feather-edge, while feather-edged springing stones, which could easily have been avoided, are shown in a diagram of a relieving arch at fig. 124, page 49. Further on, in enumerating the various materials of which cramps are made, there is no mention of galvanised iron. In the chapter on girders, there is a section of a flitch girder (fig. 152, page 58) in which the iron flitch is shown of equal depth with the timber, whereas it should, of course, be less, in order to avoid the danger of an uneven bearing surface, resulting from the shrinking of the timber. The statement on page 62, that riveted girders are considered more economical than rolled joists for depths exceeding 12 in., is, as it stands, misleading. The pains taken to explain, with a profusion of diagrams, the bonding of brickwork, are deserving of all praise; but in actual work, closers are not treated quite in the manner shown on page 25.

In the chapter on joints in carpentry, descriptions are given of joints for struts and beams, applicable chiefly to the feet of principal rafters abutting upon tie-beams. The descriptions are accompanied by good, practical diagrams, such as abound throughout the work; but it would have been better if more care had been taken to point out why some modes of construction are preferable to others. For instance, at pp. 81, 83, is explained the bridle-joint, in which the heel-strap is formed like a stirrup, with two eyes, and is secured by a bolt passing through the middle of the tie-beam. The bridle is employed, as the author states, to increase the shearing area of the beam; "besides which," he adds, "any defect in fitting is easier to discover." He omits to inform his readers of the disadvantages of such a fixing, such as that any considerable strain upon the bridle tends to enlarge the bolt-hole, and may even cause a split in the beam; or that the bridle cannot be tightened except by wedging behind the foot of the strut. Apparently Mr. Mitchell is somewhat partial to the bridle-joint, for he shows it repeatedly in illustrations of roof details, as if it were one of the best means of fixing, instead of being one of the worst. He refers to a diagram showing an excellent form of heel-strap, with ends forged and screwed, which pass through bearing plates to which they are secured by nuts, but he neither shows nor describes the check plate, sometimes employed for preventing the strap from cutting into the underside of the tie-beam. In several cases, also, the foot of the principal, instead of being framed with a tenon in the ordinary way, is left square and let into the tie-beam, a process which necessitates cutting into the latter for its entire width to an unnecessary portion of its depth.

In treating of the lead work on roofs the author figures the width of the part of the lead lining of a gutter turned up under the slates by a measurement on the slope. It would have been better had he laid stress on the fact that the lead must be taken to a sufficient height measured *vertically*. One of the points most commonly lost sight of by young draughtsmen is that the width required is greater upon a flat pitch than upon a steep one.

Notwithstanding these slight defects, which are pointed out with a sincere desire to assist Mr. Mitchell in perfecting his book, the book is a useful and even valuable one for the student. It would be pleasanter reading if what in our schooldays used to be called the definite and indefinite articles were not so frequently omitted; and it would certainly be improved by the expurgation of some grammatical errors, of which the following is perhaps the most glaring:—"Iron cramps put in hot and surrounded by asphalte is recommended by Gwilt as for ever to preserve them from oxidation" (p. 52).

That the book should so soon have reached a second edition is encouraging to its author, and the reduction in price will tend to popularise it still further.

The Student's Guide to the Practice of Measuring and Valuing Artificers' Works. Originally edited by EDWARD DOBSON, Architect. Revised, with considerable additions, by E. WYNDHAM TARN, M.A., Architect. Sixth edition. Crosby Lockwood & Son. 1889.

IT is painful to speak ill of a venerable acquaintance, but candour compels the conclusion that no sufficient reason exists for the production of a sixth edition of this book, at any rate in its present form and with the title it now bears. It might be aptly styled "A Book about Building"; but a guide to the practice of measuring and valuing artificers' work it certainly is not.

* See *The Builder* for December 29, 1888, Vol. LV., page 476.

As London is said to be full of men who know everything except how to get a living, so these pages contain something that is sound and useful on almost every subject connected with building, but nothing that is thorough and full enough to be of real value to what the preface quaintly calls the "rising student."

Indeed, the fatal fault of the book is that it attempts to do far too many things at once. In no one volume could a writer deal with all the subjects here taken in hand. Squaring dimensions, mensuration, building terms, building construction, dilapidations, ancient lights, contracts, are all treated of in a book of 326 pages, of which some fifty are taken up with a carpenter's or timber merchant's ready reckoner. A half apology is even offered for the absence of an account of the manufacture of building materials as well! At the same time there is some unnecessary detail. Thus we have, "Locks are mechanical contrivances for securing doors when closed" (p. 207). The "rising student" cannot have risen very far who requires to be told this.

Our readers will readily infer from the foregoing that the authors leave themselves but little room in which to play their title rôle and teach the art of preparing quantities, and measuring and valuing builders' works. Oddly enough, too, the attempt to do this is the least satisfactory part of the book. The profession of quantity surveyor, as now understood, has probably come into existence since this book was first written, and the methods of measurement have greatly changed. On page 312 we are told that "the whole of the work of each trade should be taken off before proceeding with the next trade." The authors rightly remark that the rules laid down by London surveyors "are superior to any others that can be adopted," and we venture to state that the practice above described has been abandoned by them for many years. A modern surveyor for taking off a window, for example, would certainly not pay it more than two visits; at the first deducting the brickwork and the facings, and measuring the lintel, arches, stone dressings, and everything else requisite to form the opening, and at the second taking the joiners' work, ironmongery, and glass, and deducting the plastering. It is obvious that although this method throws more labour on the abstracter, it is both more expeditious and less open to error than the other, possessing in addition the advantage of great convenience in adjusting variations at the end of the works.

Passing from this to the various trades in detail, let us take one example, and consider the rules given for the measurement of masonry, which is the branch of his profession presenting most difficulties to the student, and in which he needs all the help he can get. Here the work before us is hopelessly out of date. "Plain work" is a term not now used as synonymous with labour to beds and joints; nor is "sunk work" the same thing as "sunk joint." The voussoirs of an arch are not usually measured as less than the full size of the smallest stone square every way that each one can be cut out of. Steps are seldom measured except by the foot run. In the rare cases in which they are cubed and the labour taken it would hardly be fair to the builder to measure the length by $4\frac{3}{4}$ in. as sunk work to pay for the front and back rebates (p. 158). Six-inch landings also are given by the foot superficial, not cubed; and solid joggle by the foot run, not as a superficial measurement of sunk work. Similarly, to measure a stone coping feathering from 3 in. to $1\frac{1}{2}$ in. as a cube $2\frac{1}{4}$ in. thick, or to cube up a 6 in. window-sill and take the throat as a superficial of sunk work, would not be in accordance with modern practice. It is difficult to believe there ever was a time when measurements were so taken; but a "rising student" who should take out the quantities of stonework in this way now would speedily find himself in serious trouble with builders. The order of the items in bills of quantities (or what is here termed their "rotation") is, moreover, not correctly given. For example, in the smith and founder's bill it is not usual to mix up the cast with the wrought ironwork. Space will not admit of our entering into further detail: enough, however, has been adduced to show that this book is not a safe guide for the student of the art of measuring.

The instruction in valuation consists of a series of constants of labour expressed in decimal parts of an hour. These are for the most part good as far as they go, but require amplification.

In conclusion, we are glad to be able to say a word of commendation. The explanations of building terms and the description of building processes are good, and the details of construction given in Appendix II. are excellent.

Blackie's Modern Encyclopædia of Universal Information. Edited by CHARLES ANNANDALE, M.A., LL.D. Vol. VII. Blackie & Son. 1890.

THE seventh volume of this dictionary takes us to the middle of the letter S, and we presume another volume will complete the work. The article on Rome is a very good one for the scale of the dictionary. Among the architectural subjects we find "Romanesque architecture" well defined (as far as it can be defined) in a brief article illustrated by an engraving of the Church of Laach, one of the most typical examples which could be selected, and by a characteristic bit of Romanesque ornament. Roman architecture is also illustrated by a well-executed small view of the great hall of Caracalla's Baths, restored. The illustrations to the word "Roof" refer too exclusively to timber roofs, though the writer defines roof as the covering of any building, "irrespective of the materials of which it is composed." Saracenic architecture is briefly described with a notice of some of its principal structures and an illustration. In one of the articles appertaining to building, "Quirked moulding," the description seems at fault, and is rather vague. A quirk may be best described as a nick cut to throw out the form of a moulding which would otherwise die into the wall surface; a profile would have made it intelligible. This is a trifling matter, however; and in general we have been struck with the correctness and ability with which architectural subjects are treated in this dictionary.

The Timber Merchant and Builder's Vade Mecum. By GEORGE BOUSFIELD. Fifth edition, considerably enlarged and improved. London: William Rider & Son. 1890.

THE fifth issue of this work, useful alike to timber merchant and builder, has been enlarged by additional tables and rules, and carefully revised.

Many of the tables contained in this work are invaluable to those buying and selling timber, for making out accounts and checking them. In table 1 we have scantlings of almost every size, from $\frac{1}{4}$ by 1, to 14 by 14, with the number of feet required to the Petersburg standard of 120 pieces 12 ft. long by $1\frac{1}{2}$ in. by 11 in., which is almost the only standard now used. In table 2 we have the number of deals, battens, planks, boards, &c., there are in a standard, from 6 ft. up to 25 ft. lengths; and in table 3 the prices per ft. at so much a standard, or per standard at so much a foot. Many retail timber merchants sell at per ft., especially where they sell in small quantities, and this will be found very useful for this retail trade.

The French and English lineal superficial and cubic measures are given, showing the equivalents in either country, and there is a useful table showing the comparative prices per fathom and standard for fire- and lath-wood buyers. On pages 28 and 29 there is a table giving the price of scantlings (given in superficial inches) at per foot cubic. The table for calculating parts of a standard is one of the most useful in the book, and one that will save a great deal of time to those who use it. The book contains a variety of other useful tables for facilitating calculations of various kinds, as well as general information as to deflection of beams, spans of roofs, &c.: tables of the weights of different timbers, lists of exchanges in foreign countries, schedules of the brands of deals, information as to timbers newly brought into use, &c.

VALUATION OF THE FORTH BRIDGE FOR RATING PURPOSES.—The *Scotsman* says that Mr. Munro, the assessor of railways and canals, has valued the Forth Bridge for rating purposes at the net sum of 25,000*l*. Against this valuation the railway company has appealed to the Lord Ordinary in the Bill Chamber. The company maintain that the boundary of each county ends at low-water-mark, and that, therefore, the bridge, so far as it is situated between the low-water-mark on each shore, should be exempt from rating for local purposes. Should the railway company's contention be well founded, the case will rule the valuation of the Tay Bridge, the Solway Viaduct, and similar structures.

Correspondence.

To the Editor of THE BUILDER.

AN "EMPLOYERS' UNION."

SIR,—Will you allow us, through your valuable medium, to call the attention of the master builders and contractors, together with those engaged in the furniture, shop-fitting, and other affiliated trades, to the vital importance of organising, while there is yet time, a strong employers' union?

At present masters hold jealously aloof from one another, and trades unions attack them in detail, and often in a most aggressive manner, and no matter how unreasonable their demands, they are often conceded after a week's resistance, because no united stand is made.

A general meeting should take place and a chairman and committee be appointed, together with a thoroughly good paid secretary with clerical assistance, supported either by voluntary contributions, or a levy based on the annual wages paid by each firm. We believe it is the general wish that labour should have an equitable wage, indeed that the position of the working man should be improved as far as possible, due regard being paid to foreign competition, and a fair margin of profit being secured for the masters who take the responsibility and risks of the businesses which provide the opportunities for labour.

But at present the trades unions arbitrarily fix what they consider a proper wage, and, if this is not conceded at once, proceed to withdraw the men, taking care to attack only a limited number of firms at once (in case the strain on their resources should be too great), as witness the action of the French Polishers' Union just now. They then place pickets to "persuade" non-unionists not to "take the bread out of their mouths," and frequently add force to persuasion; or men who try to act independently are "spotted," and it is "made hot" for them wherever they go to work.

Such interference with personal liberty is, we contend, cowardly and immoral, and there is evidence that the law will put it down with a strong hand. It would be more to the purpose if the non-unionists had a little more pluck to carry out their convictions instead of being misled by the agitators who live on their dupes; for dupes they are, and if the present artificial and uncalled-for raising of wages is persisted in (and only employers' amalgamation can successfully check it) the Nemesis must come in the shape of trade driven from the country and much increased importation of goods produced where the new Unionism has not yet found sway.

Will influential men come forward and help an Employers' Union for the Building Trades to take practical shape? CONTRACTORS.

"A SANITARY NOTE FROM GREENOCK."

SIR,—I notice in your journal of the 6th inst. your correspondent, W. P. Buchan, referring to a "Sanitary Note" that I sent from Greenock, and which appeared in your issue of August 16 last, says that I attacked the Glasgow system of trapping and ventilating house-drains, and found fault with the Greenock officials for recommending drainage to be done in Greenock on the Glasgow plan. He further adds that I do not really find fault with the Glasgow system of trapping, but with the system in which the traps are ventilated. Now, I beg to state that the article referred to was neither intended to find fault with nor hinder sanitary reformers in their good work, but merely to state what is really being done, and to draw attention, particularly of parents, to the fact that the preservation of the health and lives of their children is a far more important consideration than that of any pecuniary gains of a few parties interested in the sale of traps or the repair of defectively-constructed drains. Your correspondent, "W. P. B.," goes on to say that he has no objection to siding with me in a general condemnation of the inlet ventilating grating being put directly over the traps, especially when these traps are on the pavement and close to the building, but that the complaint of bad smells from the grating can be easily cured without going to the expense of carrying up ventilating pipes to the roofs—viz., by putting an iron plate over the trap and then having the fresh air inlet a couple of yards or so to one side; that this has been a common practice in Glasgow for years, and if Greenock follow suit the ground for my complaint will vanish, "especially if the work is properly done." It matters little how well the work may be done. I fear the cure suggested would be an aggravation of the complaint by adding two yards more pipe, which would give a

greater volume of gas to eject on to the street every time that a bath or closet were used. The suggestion would no doubt save the pockets of proprietors, but would not lessen the danger to the lives of children. I observe that last month's "Sanitary Journal" still bears out the fact I formerly referred to,—viz., that the infantile mortality is highest in Glasgow, being 44 per cent. of the total deaths, and that where more is being done in the way of sanitary reform than in any other town in Scotland, in view of that fact, it would be dangerous to follow in the wake of Glasgow.

I have no hesitation in asserting that house drains, if properly constructed, would outlast every other part of the building with but little or no repair. The almost imperishable materials now used in their construction make this an absolute certainty.

But instead of that, the drains are generally the most troublesome and expensive part of house property. This is, in a great measure, owing to the fact that the drains of a building are generally included in the mason's contract, and regarded by him as a branch of the work that may be done by the least experienced workmen. The contractor generally puts the lowest paid and unskilled of his men to do the work. It is not these men's fault, but rather their misfortune, that they have not had a thorough training to fit them for their task. However, I trust the day is not far distant when no man will be allowed to construct a house-drain unless he has passed a board of qualified examiners, and obtained a certificate that he has sufficient knowledge, both theoretical and practical, how to execute the work without the risk of leaving defects that are certain to produce disease.

Traps on house-drains are in many cases a necessary safeguard against danger resulting from defective construction. It is most desirable that all drains should be so trapped off from the interior of the dwelling that there can be no possibility of gases from them getting admission thereto. But to trap them so as to prevent the escape of sewer-gas above the main roof and make provision for the possibility of its escape on either the pavement or any other part of the street or court is a very questionable practice, particularly in such places as Glasgow or Greenock, situated as they are on a tidal river with a strip of level ground along its bank and rising ground in the rear, the outlet of the sewers being exposed at low tide, while at high tide the sewers in the level streets are filled with water, and there being no provision for the escape of gases at the upper extremities of the main sewers, they get so completely bottled up and compressed between the rising tide and the traps that they force their way through the water in the traps in streets, sinks, and closets in our dwellings. That this is the case I know from experience, having lately had to resist a case where it was proposed to make a connexion between a property and a main sewer into which the tide flows; the sewer being so level that it is practically a long cesspool, the street having at frequent intervals to be opened at every 30 ft., so as to get the deposited contents cleared out. And, strange to say, of late the four-story buildings in the line of that street have had intercepting traps placed at the bottom of conductors which have no connexion with the building beyond the carrying of the rain-water from the roofs to the drains.

The local authority in their wisdom have sanctioned this, and no doubt with good intentions have also authorised the constructing and connecting with this long cesspool a new main sewer into a side street, over which new sewer several open gratings are placed to allow the gases to escape in the centre of the street, in preference to letting them escape above the roofs of the houses.

X. Y.

SIR,—In your issue of the 16th ult., you publish "A Sanitary Note from Greenock." In this there is a very palpable error. Your correspondent says:—"Of the total deaths in Glasgow, 45 per cent. occurred among children under five years of age. . . . There is certainly some preventable cause at work that requires special attention, and until that cause is discovered and mastered, the fact that nearly half of the human beings born in these cities sicken and die before reaching the fifth year of their age, &c." The 45 per cent. referred to is of the total deaths, not 45 per cent. of the births.

I more particularly wish to enter a plea for what will, no doubt, be considered by many a retrograde movement in sanitary matters, viz., the abolition, except in a few very special cases, of that abomination—the syphon or intercepting trap. I read your articles on house-drainage in the "Student's Column," which contained many valuable hints, but all advocate the syphon. In the first place, the syphon is the most fruitful source of stoppages in house-drains; in the second place, it generally contains a certain amount of filth; and, thirdly, it shuts off all means of free ventilation to the sewers. This last is, I am well aware, the desideratum of the persons advocating them; what this is for I fail to see in any locality in which the sewers are fairly well cared for by the Local Authority, as, in ninety-nine cases out of a hundred, sewers are in a far cleaner condition than house-drains. Sewers receive, in every well-regulated district, special attention in the shape of flushing and cleaning by properly qualified sewer-flushers, and I have never come across a private house the drain of which receives periodical attention from any one. This, taken in consideration with the fact that in house drains there is only an intermittent flow, whereas in sewers the flow is continuous, gives a decided preference to the air in the sewers over that in house drains,—there should be no such thing as sewer-gas except in cesspools,—therefore it seems self-evident that the best system of house drainage is to have a free access from the sewer through the house drain and up the soil-pipe and ventilator, which should be of the full diameter of the soil pipe, and not a 2 in. pipe as is so often used. The fresh air inlet is very often the foul air outlet placed in a position most dangerous to health; the head of this inlet is frequently fitted with a mica flap, which is mostly out of order; if carried up to the top of the house at the same level as the ventilator, as is also done, the balance of the air in the house drain is equal on each end, and at a complete standstill, instead of a continuous current as it should be, and *is* where the sewer is ventilated by surface gratings in the middle of the road and the soil-pipes of all houses properly ventilated, without syphons on the house drains.

ERNEST VAN PUTTEN, Assoc. M.Inst. C.E.
Lewisham, September 4, 1890.

"THE GREAT TOWER FOR LONDON."

SIR,—Having seen your notice on the book compiled by me on the above subject, I wish to point out the following facts. You say the descriptions are "very incomplete." This must of necessity be the case when the authors of some of the designs either gave no description at all or else very vague ones. It could hardly be expected that I, as compiler of the book, should invent descriptions or supplement those so vaguely given.

The compilation of the book was well considered, and in regard to the inaccuracy of the cost of the design (No. 19), the fact that the author of this design has admitted that the figures given by him in his description were wrong, and which I was guided by, clears me of any blame. Had the author given the figures correctly they would, no doubt, have been correctly published in the Tower book. The figures in reference to Design No. 19 given in the Tower book are, at least, a correct addition of the several items given by the author, and there is nothing in his description to indicate that the sum of these items does not represent the total cost.

FRED. C. LYNDE, A.M. INST. C.E.

*** We must of course accept Mr. Lynde's statement that he did the best with the materials at his command. Indeed, in the last sentence of our notice, we suggested that the authors of the various designs had been "judiciously reticent in their descriptive notes." As to the error in cost of design No. 19, we were at first requested to publish a letter from Mr. Couchman pointing out that the fact is as we stated. Mr. Couchman, it is true, admitted a clerical error, in casting up, of a comparatively small amount (some 20,000*l.* or 30,000*l.*, if we recollect aright); but he submitted to us his report sent in with his design, which, as we read it, showed that the amount of his estimate for the tower complete, including of course labour and materials, had been erroneously added by the compiler of the book in question to the amount of a separate estimate for labour and superintendence of construction only, thus adding about 800,000*l.* to Mr. Couchman's estimate. Mr. Couchman's tower, moreover, is (as we might have pointed out before) octagonal on plan, and not circular, as described in the book. —ED.

CAMBRIDGE UNIVERSITY ASSOCIATION OF BRASS COLLECTORS.

SIR,—As I have already been applied to for information about this Association by people who have seen the paragraph in last week's *Builder*, and as I expect to receive many similar applications, may I ask you kindly to correct in your next issue a mistake which Mr. Beloe unwittingly made in his short notice of the Society?

The subscription formerly was 5s., but, owing to the rapid growth of the C.U.A.B.C., it had become inadequate, and therefore was increased to 10s. at the last general meeting in June.

R. W. M. LEWIS.
Hon. Corr. Sec. C.U.A.B.C.

THE EDINBURGH AND GLASGOW AERATED BREAD COMPANY have erected extensive works at Glasgow, and which are fitted up with all the recent and modern improvements. The ventilation of these works has been carried out by Messrs. Baird, Thompson, & Co., of London and Glasgow.

A "PALIMPSEST" TOMBSTONE.—Archæologists are familiar with "palimpsest" brasses, but if we may believe a writer in the *South London Press*, there is in Norwood Cemetery a tombstone erected to the memory of a Nonconformist minister which can only be described as a "palimpsest." The stone in question is stated to be considerably decayed, and it is added that "another name can be plainly traced" underneath that of the minister in question!

The Student's Column.

HOT-WATER SUPPLY.—XII.

PIPES AND COCKS: *continued*.

TAPS.—There is, as every one knows an enormous variety of these in the market, but, notwithstanding the many improvements and advanced ideas in this direction, a perfect tap, or a nearly perfect one, still remains to be introduced. There are numbers of these articles to be met with that display excellence of quality and careful workmanship and finish, yet it is doubtful if any maker is prepared to supply a ¾-in. bib-tap for hot water, guaranteed to last more than twelve months without leaking, in a large residence where the tap is in fairly constant use—at the scullery sink, for instance.

The most usual form of tap to be met with, and one which is found to give fairly good results, is that having a plug through its centre and known as a plug-cock (fig. 21). These are made either with a nut bottom (a nut being screwed on to the plug at its lower end), as illustrated, or with a solid bottom, the plug being secured with a cap screwed on at the top, as fig. 22, this cap forming a stuffing-box; or

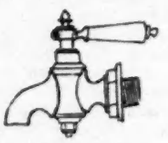


FIG. 21.

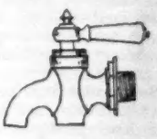


FIG. 22.

there is another with a solid bottom, the plug being secured by a plate at the top (fig. 23), this being called a "gland" tap. Either of the two latter are preferable to the former, as those secured by a nut at the bottom sometimes leak at that point, which is impossible with the others. These three are the forms of tap alluded to in a former paper as "quick-shutting" (in contradistinction to the slow-shutting screw-down taps), and which cause the concussive noise in the pipe when shut off suddenly where a good pressure of water exists. There is a very simple remedy for this, which will at the same time check the violent outrush of water experienced when a great pressure exists; this is effected by reducing the bore of the tap at what is called the "tail," the screwed portion that enters the pipe, as in fig. 24. This is quite

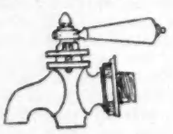


FIG. 23.

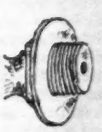


FIG. 24.

understood by the makers, many of whom keep these "checked" taps in stock. Workmen sometimes do this themselves by cutting a circular piece of sheet brass or zinc, and, after making a suitable hole in it, solder it on to the end of the tail.

Where there is a pressure of 15 lbs. to 20 lbs. (cold-water cistern situated 35 ft. or 46 ft. above the tap), the hole in the tail of the tap may be reduced to ¼ in.; with a 10 lb. pressure a ¼-in hole is ample.

Screw-down taps overcome the concussion difficulty, by its being impossible to close them suddenly; but these taps, however well made, require "re-leathering" periodically, that is, the seating or diaphragm, whether rubber, leather, or composition, requires renewing somewhat frequently, and if the tap is not of good quality the thread of the screw-down arrangement wears or strips off quickly. This style of tap is now largely used, but it has an opponent in every servant that has to use it, as it cannot be opened or closed quickly, and in many busy houses a tap is oftentimes applied to a dozen or more times per hour, in which case the unscrewing and screwing usually leads to a loss of temper.

There is a modified form of this tap now being made which can be opened or closed in one turn, or they can be had to open or close with a half turn, which is as quick as a plug-cock; this overcomes the difficulty just referred to, but a new disadvantage is introduced with them, as when the abrupt thread of the screw-

down arrangement wears loose, a fair pressure of water will lift the seating slightly, and permit of leakage, and the thread of a screw-down tap is a troublesome part to repair.

It is now considered best, when purchasing baths or lavatory basins, to choose those that have the hot and cold taps fitted and attached to them, so that the connexion of the pipes to the unions provided is all that is needed to complete them. This is a much better and neater arrangement than having the taps projecting from the wall over the basin or bath, and it not infrequently happens, when this is done, that the hot and cold taps will be found of different patterns, as the hot and cold draw-off services are so commonly fitted up by different tradesmen (hot-water fitter and plumber). When the taps are fitted to the bath or basin by the maker they are sometimes placed out of sight, only the handles being visible, these having porcelain discs upon them marked either "HOT" or "COLD," and altogether a very superior result is effected with very little extra cost.

It has been the usual practice with makers, when supplying baths fitted with taps, to place the taps in question on, or nearly on, the rim of the bath, so that the water issuing has to fall about 18 in.; there is no objection to this with the cold-water tap, but with the hot tap it is an objection, as the falling hot water throws clouds of steam into the room, making it very unpleasant, particularly if the room be small. This objection is overcome by having the hot-water inlet situated near the bottom of the bath (not in the bottom itself), so that it is quickly covered with water, which prevents the steam arising; it is as well to have both hot and cold inlets thus situated, as the bath will then fill noiselessly.

This arrangement must not on any account be confounded with the method adopted in the old pattern zinc and copper baths to be met with, into which the hot and cold water issues through the waste grating in the bottom of the bath; the particular objection to this is that, when the bath is emptied after bathing, a certain amount of soapy, objectionable sediment is always left just in the waste outlet beneath the grating, and this substance is washed back into the bath by the inflowing water when the next person makes ready to bathe.

It is very desirable to have fair-sized service pipes carried and connected to a bath, and the taps should be as large as possible, say 1 in., as a slow-filling bath is as much a source of annoyance as one that empties slowly.

The majority of best quality and even many cheap-made baths are now fitted with the taps and with soap and sponge trays, all *within* the bath; this is an excellent feature, preventing drip water and soapy matter finding its way to the floor, or if the bath is encased it prevents the woodwork being injured from the same cause. When the bath taps are placed *on* the wood bath rim there is invariably a collection of dirt there, unless they are very carefully cleaned, and in this latter case the cleaning leads to the polish being rubbed off the woodwork and creating an unsightly appearance around the taps.

A very useful and not expensive adjunct to a bath is a shower apparatus; the old form of this appliance was a most inconvenient and troublesome thing, as it consisted of a suspended vessel or reservoir which had first to be filled before allowing its contents to be showered down; this, although cumbersome and unsightly,

FIG. 25.

FIG. 26.

answered very well with cold water, but if a warm or tepid shower was required there was no way of testing the temperature except by climbing up and testing it with the hand; otherwise the result would be most uncertain, if not risky.

The more modern form of shower attachment is as fig. 25, consisting of a board of polished wood (to match the bath casing) on which is affixed the hot and cold taps and the shower rose; the method of connecting the pipes is shown at fig. 26, which illustrates the back of the board. It will be seen how simply the temperature can be regulated, so that, if desired, the shower can gradually be made to vary from warm to cold, and the shower can be continued any length of time. A further useful adjunct which can be attached to the shower board inexpensively is a small tap with a nozzle, to which can be secured a piece of india-rubber tube, and this, if fitted with a rose, can be used either for shampooing purposes or for rinsing out the bath after use.

SURVEYORSHIPS.

CHELMSFORD.—Mr. Charles Law Green has been appointed Borough Surveyor of Chelmsford, in the room of Mr. Charles Pertwee, resigned.

CHELTENHAM.—Mr. Joseph Hall, C.E., the newly-appointed Borough Surveyor of Cheltenham, was at Torquay a few days ago the recipient of a testimonial, in recognition of the services he had rendered to that town as Surveyor to the Local Board during a period of nine years. The presentation was made by Mr. R. S. S. Cary, lord of the manor, and consisted of a Beck's first-class binocular microscope, with various powers (eye-pieces, polariscope, &c.).

MARKET BOSWORTH.—At a meeting of the Market Bosworth Board of Guardians, acting as a Sanitary Authority, on the 10th inst., the Clerk read a letter from Mr. Horton, the Surveyor, stating that he had been appointed Surveyor to the Felixstowe Local Board, and asking that he might be released from his duties on the 26th inst. The Board accepted his resignation.

YEOVIL.—Mr. W. K. L. Armytage, Assistant Borough Surveyor, Preston, who is leaving Lancashire to become the Borough Surveyor of Yeovil, was the recipient of a present from the officials of the Preston Corporation a few days since. The presentation was made by the Mayor of Preston, on behalf of the officials, and amongst those present were the Town Clerk, the Borough Surveyor, Borough Treasurer, Medical Officer of Health, and other officers of the Corporation. The gift consists of a silver fruit-dish, embossed in high *repoussé* with fruit and flowers, and bearing the inscription:—"From the officials of the Corporation of Preston, to W. K. L. Armytage, Assistant Borough Surveyor, on his leaving Preston to become the Borough Surveyor of Yeovil, September, 1890." Accompanying the gift were several volumes of expensive technical works.

OBITUARY.

MR. ANDREW M'KELVIE, C.E.—News has been received in Dundee of the death by drowning of Mr. Andrew M'Kelvie, architect and civil engineer. He was making a trip on board a steamer, when he was washed overboard and drowned during a storm off Cape Hatteras, North Carolina.

MR. CHARLES POOLEY, F.S.A., died on the 3rd inst., in his 74th year. He was a surgeon, but took great interest in antiquarian studies, and wrote a work on the Old Crosses of Gloucestershire and Somersetshire.

GENERAL BUILDING NEWS.

PROPOSED PUBLIC BATHS FOR STAFFORD.—At a meeting of the Stafford Town Council on the 12th inst., the Public Baths Committee recommended that for the purpose of obtaining competitive designs for the proposed baths, premiums of 25*l.* and 10*l.* should be offered for the two best plans sent in, and that the accepted plans should become the property of the Corporation. Mr. Matthews proposed the adoption of the report, and Mr. Flamank seconded the resolution. Mr. J. C. Mycock said he was sorry the committee had adopted the course they had in reference to the front elevation for the baths. He thought the competition would be an expensive matter. He took it that at the last meeting the only objection that the Council had to the plans was that the frontage was of too plain a character. He thought suitable plans could have been obtained at a small expense,* and stated that he had seen a new plan of the front elevation which had been drafted by the Surveyor and which he thought would do. Alderman Goodall asked if the architect whose plan was accepted would expect commission on the amount of the contract, and Alderman Peach pointed out that the terms of the resolution were that the plans should belong to the Corporation. After a great deal of discussion, an amendment was unanimously carried as follows:—That the recommendation of the Committee be not adopted, and that they be instructed to submit an alternative elevation prepared by the Borough Surveyor, for the approval of the Council at their next meeting.

* Mr. Mycock, and the Committee too, evidently think that architects can afford to work for nothing.—ED.

PROPOSED PEOPLE'S HALL FOR LIVERPOOL.—For the last year or two a scheme has been maturing for the erection of a much-needed "people's hall" in Liverpool. A Liverpool paper publishes a sketch of the proposed building, as designed by Mr. Edmund Ware, architect, Lord-street. When first proposed, the scheme was warmly taken up by several wealthy gentlemen of the city, who promised to help on the good work by every means in their power. The proposal is as follows:—To secure a piece of land like that at the bottom of William Brown-street for a site. The small concert-room will seat 250 people, and this can be made available for concerts, dramatic performances, public meetings, and all the requirements of our rapidly deepening city life. Then comes the great hall, which is also arranged for in the block which has been planned by Mr. Ware. This will seat 2,500 people, and another thousand could find ample accommodation in the spacious aisles. It is planned to have a very small gallery at one end, with a large platform at the other, and a level floor set with chairs or moveable seats. The entire scheme is estimated to cost 30,000*l.*

STABLES AT SWANSEA.—Messrs. B. Evans & Co. have just had completed in Frog-street, Swansea, what are described by the *Western Mail* as a model range of stables. The main front is of Ebbw Vale bricks, with Bridgend stone dressings, and contains a house for the stable manager. Inside the entrance is an open paved yard, and opposite to the doors is a van-shed capable of holding a score of large vans. Over this shed is a large workshop. On the left-hand side on entering the yard from the street is the stable building. A lofty arch admits to a large covered yard, which will be used for cleaning the horses, &c. The stable itself is on two sides of this covered yard, the third side being occupied with the harness-rooms and washing place. The floor is paved throughout with buff adamantine clinkers, laid to proper falls, and draining into a covered gutter which runs along the back of the stalls. The stable is divided into twelve stalls and two loose-boxes, thus giving accommodation for fourteen horses. The whole of the stall divisions, mangers, &c., were supplied by Messrs. Musgrave & Co., of Belfast. An office, weigh-bridge, washing-room (with hot and cold water), a range of lofts, corn-rooms, &c., are also provided in the building. The contractors were Messrs. Jenkin Bros., of Swansea, and the architect was Mr. H. C. Portsmouth, Swansea.

PROPOSED CENTRAL POLICE STATION AT SWANSEA.—A special meeting of the Swansea Watch Committee was held at the Town Hall on the 12th inst., to consider a scheme for the provision of a central police-station and the abolition of the stations at High-street, Goat-street, Guildhall, and Oxford-street. Councillor Morgan detailed the scheme, the consideration of which was adjourned.

WESLEYAN METHODIST SCHOOL AT RUSHOLME, MANCHESTER.—The foundation-stone of a new Wesleyan Methodist School in Dickinson-road, Rusholme, was laid on Saturday last. Mr. Herbert Turner, of Manchester, is the architect, and the estimated cost is 1,800*l.* Messrs. Smith & Goodwin, of Lower Broughton, are the contractors.

NEW BISCUIT MANUFACTORY, CARLISLE.—A large building for Messrs. Carr & Co., biscuit manufacturers, is now in course of erection at Caldewgate, Carlisle. Mr. T. Taylor Scott, of that city, is the architect. The foundations were put in in March last by Messrs. Johnstone Bros., builders, Blencowe-street. Since then the contracts for all the works have been let to the following tradesmen, viz.:—Builders' work, Messrs. Johnstone Bros., Carlisle; fireproof construction, tanks, and all iron-founders' work, Messrs. Homan & Rodgers; carpenter and joiner's work, Mr. Wm. Lattimer; plumber's work, Messrs. W. & R. M. Hill; slater's work, Mr. Thos. Graham; and plasterer's work, Messrs. R. M. Ormerod & Sons, all of Carlisle. The bricks that are being used are from the Birkby brick manufactory. The new buildings include a chimney-shaft 170 ft. high.

STABLES, &c., MERTON HALL, NORFOLK.—An extensive range of buildings is now in course of erection at Merton Hall, for the Right Hon. Lord Walsingham, to replace the old stables which were destroyed by fire in April last. The new buildings consist of stables, carriage-houses, harness-room, washing-houses for horses, carriages, and harness, coachman's house, men's mess-room, bed-rooms for grooms, hay, straw, and corn-lofts, and the necessary offices. The buildings are being carried out from designs by and under the superintendence of Messrs. Milne & Hall, architects, London, by Mr. William Hubbard, contractor, East Dereham, Norfolk, at an outlay of about 3,000*l.*

BOARD SCHOOLS, COVENTRY.—The Coventry School Board on the 11th inst. resolved to accept the tender of Mr. James T. Wingrove, of Northampton, for the erection of new schools in Wheatley-street. Messrs. George & Isaac Steane, of Coventry, are the architects. The contract sum is 15,595*l.*

COTTAGE HOSPITAL, BROMSGROVE.—The site for the cottage hospital at Bromsgrove is now being cleared. The building will face the New-road, with a side drive approach from Edial-lane. The builder is Mr. J. Brazier, of Bromsgrove, and the contract sum is 2,673*l.* The *Bromsgrove Messenger* of the 13th inst. gives a long description of the building, but omits to mention the architect's name.

PROPOSED NEW MUNICIPAL BUILDINGS FOR COVENTRY.—The Corporation of Coventry, with a view to provide additional accommodation for the transaction of the business connected with the growing needs of the city, have provisionally purchased certain property in St. Mary's-street and Earl-street, contiguous to St. Mary's Hall, for the erection thereon of additional municipal buildings, and they have petitioned the Local Government Board to sanction the purchase.

THE SALVATION ARMY TEMPLE AT EXETER, which was at one time used as a meeting-place for the Friends, has just been considerably altered and enlarged. The seating accommodation has been increased from 900 to 2,000 persons. Mr. G. Coles, builder, of Exeter, carried out the work, from plans by Mr. J. Williams Dunford, architect, London. Mr. T. Morgan acted as architect's clerk of works.

PROPOSED CREMATORIUM FOR MANCHESTER.—The *Manchester Courier* of the 9th inst. publishes a sketch of the design by Messrs. Salomons & Steinthal, architects, of that city, for the crematorium and columbarium it is proposed to erect in Manchester. At the statutory meeting of the shareholders of the Company which has been formed to establish the crematorium, recently held, it was stated that the directors had selected a plot of land suitable for the building of such a place, on the Chorlton side of the Southern Cemetery, on Barlow Moor-road. The crematorium would thus form, as it were, a continuation of the Southern Cemetery, so that there exists a possibility of it at some future time being incorporated with the cemetery, should this ever be found desirable. The proposed crematorium will consist of a hall or chapel containing the furnace, with open columbaria for the reception of the urns and memorial tablets, and it is proposed to place the same in the centre of the plot of land acquired and about 50 yards from the road frontage. The hall will be about 50 ft. long by 25 ft. wide, and of proportionate height; in the centre at one end of the same against the wall will be placed the furnace, concealed in an ornamental marble shell, doors in either side of the same giving access to the vestry and record-room on the one side, and to the room for the gas generator, &c., on the other, steps from the latter room leading down to the engineer's-room and the basement. The hall will be flanked on either side by open arched colonnades, forming a columbarium, the recesses for the urns being formed in the exterior of the wall of the hall. An important feature in the composition will be a tower containing and masking the flue from the furnace. The style selected for the building is Romanesque, and it is proposed to build the same in stone, with red tiled roofs.

NEW BANKING PREMISES, BRAY.—The Northern Banking Company of Ireland have completed and opened their new office on the Quinsborough-road, Bray. The premises are situate opposite to the District Post-office. The works throughout have been carried out from the designs and under the personal superintendence of Mr. George P. Beater, architect and civil engineer, the contract for the general works having been entrusted to Mr. John Good, and that for the sanitary arrangements to Messrs. Fletcher & Philipson, all of Dublin.

ST. JAMES'S CHURCH, SLAITHWAITE.—On the 6th inst. the Earl of Dartmouth laid the memorial centenary stone forming the basis of a large number of external and internal improvements which are in progress in connexion with St. James's Church at Slaithwaite. The church was built in the latter half of the eighteenth century, and has no architectural pretensions. It was decided last year to restore the church, and the work has been placed in the hands of Messrs. John Kirk & Sons, architects, Huddersfield, and the cost is estimated at about 3,500*l.*

SANITARY AND ENGINEERING NEWS.

THE ASSOCIATION OF MUNICIPAL AND SANITARY ENGINEERS AND SURVEYORS will hold a meeting at Edinburgh on September 26 and 27. On Friday, the 26th, they will meet at ten a.m. at the Royal Scottish Society of Arts, George-street, Edinburgh, where a paper will be read by Mr. Cooper, A.M.I.C.E., Burgh Engineer of Edinburgh, on "Municipal Work in Edinburgh," followed by a paper on "The Cable Tramways of Edinburgh," by Mr. W. N. Colam, A.M.I.C.E. After the discussion the members will be taken over the cable lines and visit the machinery depot, &c. At one p.m. the members will be received by the Lord Provost and members of the Corporation of Edinburgh at the City Chambers. The members will then proceed to the Exhibition, where they will be received by the Executive Committee, and visit the Exhibition. On Saturday, the 27th, members will leave the Waverley Station by the 9.50 a.m. train for Queensferry (North). They will be met at the station, north of the Forth Bridge, and conducted over the bridge on foot, then embark on a small steamer, passing under the bridge and around the piers, back to the south side, returning to Edinburgh by coach through Lord Rosebery's grounds. If time permits, a visit will be paid to Holyrood Palace, the Cathedral, or other places and objects of interest.

THE REGISTRATION [OF PLUMBERS.—Among the resolutions passed at the recent Trade Union Congress at Liverpool was the following:—"That, in the opinion of this Congress, the Registration of Plumbers should be made compulsory; that the number of Sanitary Inspectors should be largely increased by the appointment of duly qualified plumbers; and that the apprenticeship of these should be made the rule of the trade, the indentures to provide for the technical education of the apprentice."

VISIT OF THE SOCIETY OF ENGINEERS TO CREWE.—A very interesting visit was made on September 16 by the Society of Engineers to the London and North-Western Railway Works at Crewe. Upon the arrival of the visitors at the works (which cover an area of over eighty-five acres of ground) they were conveyed to the Bessemer Steel Converting House, where the process of steel-making was shown, after which they proceeded past the Siemens-Martin Furnaces to the 14-in. Merchant Mill, where the spring-plates and fish-plates are rolled. Here the latter, after being passed through the rolls, are sawn to the required lengths, punched, straightened, and finished ready for sending away. Thence to the Rail Mill, which was occupied in rolling 30-ft. lengths of rails, 90 lbs. per yard; thence to the Points and Crossings Shop, where the different kinds of switches and crossings were in process of manufacture. The next shop which was visited was the Boiler Shop. Here locomotive and stationary boilers, as well as bridge-work, were seen in different stages of manufacture, the hydraulic riveting machinery being especially worthy of notice. Thence they passed on to other departments of these extensive and interesting works, and were conveyed back to London by express train.

UCKFIELD WATER-WORKS.—The water-works for Uckfield (Sussex) have recently been carried out from the plans and under the superintendence of Mr. H. Bertram Nichols, A.M.I.C.E. A pumping scheme has been adopted, gravitation not being available. A well has been sunk at Hempstead, and a bore-hole carried down to a depth of 278 ft. into the water-bearing strata. The water rises in the well to within 7 ft. of the surface, and an abundant supply of good quality has been met with. The motive power for raising the water to the service reservoir is a petroleum engine, supplemented by wind power, the windmill, of the "Halliday" pattern, being carried up to a height of 90 ft. Great economy is thus experienced in the annual working expenses, gas and coal being expensive items in the district. The service reservoir, having a capacity of 250,000 gallons, is constructed of concrete, and covered. A good pressure is obtained throughout the town. The mains vary from 5 in. to 3 in. in diameter, and sluice valves, hydrants, &c., are fixed in suitable positions. The work has been promoted by a private company, and the cost has been about 3,500*l.*, which is irrespective of land, parliamentary, and other charges. The contractor for the well and bore-hole was Mr. N. Mouzier, of Birmingham. The remainder of the works forming the main contract were satisfactorily carried out by Messrs. W. Jenkins & Sons, contractors, of Leamington.

THE LOCAL GOVERNMENT BOARD have issued to Sanitary Authorities a circular as to Provisional Orders under the Public Health Acts, the Local Government Act, 1888, the Housing of the Working Classes Act, 1890, and the Gas and Water Works Facilities Acts. They direct that all applications for Provisional Orders under these enactments must be received by them not later than November 30 next, except that applications under the Lands Clauses Acts may be sent in up to December 21. The circular is accompanied by special instructions as to improvement schemes under the Housing of the Working Classes Act of last session.

WATER SUPPLY OF SHREWSBURY.—A long and tedious discussion which took place at the meeting of the Shrewsbury Corporation last week as to the water supply of the town terminated, practically, in a determination to do nothing. The *Shrewsbury Chronicle* remarks that "this unfortunate disposition to defer all improvement until a new and absolutely pure supply of water from an uncontaminated source can be entered upon is neither fair to the new Water Committee nor just to the ratepayers. While anxious to give the majority in the Council the credit of good intentions in not expending more money than is absolutely necessary upon the present impure source of supply, we think they ought to have met the minority in a fairer spirit, and have welcomed the suggestion to improve as much as possible, as a temporary expedient, their present supply, at the least possible cost, rather than to have rejected it *holus bolus*." The opponents of the proposals of the Water Committee contended that any outlay with the view of continuing the present supply as permanent or final would be altogether at variance with the opinion of the medical practitioners in the town, who complain of the prejudicial effects of the Severn water upon the health of the inhabitants. In the course of the discussion, a report by Mr. Baldwin Latham was read, condemning the situation of the intake on the Severn as likely to endanger the health of water-consumers. There seems to be no doubt that eventually Shrewsbury will have to face this vital question.

THE DRAINAGE OF SUTTON COLDFIELD.—In consequence of the complaint received by the Sutton Coldfield Corporation of the great volume of sub-soil water which found its way into the main sewers, measures have recently been taken by the Borough Surveyor (Mr. C. F. Marston, C.E.) to prevent this infiltration. As the result of an examination of the sewers he discovered (according to the *Birmingham Gazette*) that, owing to the stoppage of a sub-soil drain and other causes, upwards of 50,000 gallons of water were entering the sewer every twenty-four hours near the Victoria-road. To stop this large infiltration, a length of about 50 yards of the 18-in. sewer has been taken up and relaid, at his suggestion, with Hassall's patent safety joint-pipes, in place of the old earthenware pipes. An inspection of the joints of these pipes was made on the 4th inst., in the presence of a number of engineers and others interested in sanitary work. The pipes were subjected to a severe test, and the result is stated to have been most satisfactory.

PROPOSED BATHS AND WASH-HOUSES FOR LAMBETH.—At the meeting of the Lambeth Vestry on the 11th inst., Councillor Hubbard moved "That a Special Committee be appointed to consider and report as to the advisability of establishing Baths and Wash-houses in the parish." He pointed out that a large number of parishes in the metropolis had established baths, and had not found them a very costly thing. Mr. Howlett seconded the motion, but hoped that the Committee would act carefully in the matter, because Lambeth was very well supplied with swimming accommodation. What he wanted to see established—especially in the more crowded portions of the parish—were the wash-houses. The motion was agreed to.

CLONMEL WATER WORKS AND SEWERAGE.—The "London engineer" named in a paragraph under this heading on p. 195 *ante* as assessor in this competition was Mr. J. C. Melliss.

STAINED GLASS AND DECORATION.

MEMORIAL WINDOW TO KING ALFRED.—A memorial window to King Alfred, the outcome of efforts in connexion with the jubilee of Queen Victoria's reign, has been inserted in the west end of Wedmore parish church. The window is the work of Messrs. Clayton & Bell. In the upper part of the design are three crowned heads of kings—Henry III., Edward III., and George III., and beneath these in rich colours are full length figures—Alfred, William I., Elizabeth, and Victoria. Beneath each figure is a historical scene, representing Alfred in the Isle of Athelney, Guthrum at Wedmore; Harold swearing to Duke William that he will not lay claim to the throne of England, and the Battle of Hastings and death of Harold; Sir Walter Raleigh spreading his cloak before Queen Elizabeth, and the Spanish Armada, are represented beneath the figure of Queen Elizabeth; and beneath that of Queen Victoria are the coronation of the Queen and a group representing her Majesty surrounded by her family.

WEST WINDOW, EXHALL (BEDWORTH) CHURCH.—The three-light west window of this church has been filled with stained glass, representing (1) Our Lord Blessing Little Children, (2) Hannah presenting Samuel to Eli, (3) Eunice and Lois teaching Timothy the Holy Scriptures. The work has been executed by Messrs. Hardman, of Birmingham.

THE COLBORNE MEMORIAL IN HEREFORD CATHEDRAL.—A stained-glass window has just been placed in one of the north transept clearstory windows of Hereford Cathedral, adjoining the window erected to the memory of a previous organist (Mr. Townshend Smith), from the works of Messrs. Clayton & Bell, London, to the memory of the late organist, Dr. Colborne. In the centre light is a figure of St. Cecilia playing on an organ, with an attendant angel. In each of the six circular lights surrounding the centre are angels playing on musical instruments. The window has been fixed up by Mr. Robert Clarke, of Birmingham.

THREE BRONZE PANELS, bearing the name and date of foundation, have lately been placed in the Clare-street front of the new building in Bristol for the Provident Life Office. They are the work of Messrs. Singer & Sons, of Frome, Somerset, from the designs of Mr. E. Henry Edwards, architect, Bristol.

WINDOWS AT ALMONDSBURY CHURCH.—Three west windows, the gift of Mr. Sholto Vere Hare, in memory of his late wife, are now in course of execution at Almondsbury Church by Mr. Hardman, of Birmingham, and it is hoped that they will be placed in position by Christmas. The general scheme of subjects represented in the three windows is intended to set forth:—1st. Death and the grave conquered in the Resurrection. 2nd. The blessed hope that we may follow Him in His ascension into Heaven. 3rd. The reward of the good deeds done by His faithful servants while in the flesh, and their admission to the enjoyment of the beatific vision to all eternity.

WALKER MEMORIAL WINDOW, LISSAN CHURCH.—On the 3rd inst. a memorial window in Lissan Church, North of Ireland, to the memory of the Rev. George Walker, D.D., who was Governor of Derry during the siege of that town, was unveiled. It is the work of Messrs. Carlisle & Wilson, of Belfast.

FOREIGN AND COLONIAL.

FRANCE.—The splendid collection of tapestries of the Cathedral of Rheims is at present undergoing a process of cleansing and repair. These tapestries date from the sixteenth century and were given to the Cathedral by the Cardinal de Lorraine: they represent the life and death of the Virgin. A copy of the "Venus à la Coquille" of Coysevox, by M. Suchetet, has just been placed at the end of the "Parterre de Latone" in the park at Versailles, to replace the original which, after repair, has been more safely lodged in the Louvre. ——The Subscription Committee for the National Monument to Joan of Arc, at its last meeting, appointed three of its members, of whom M. Bailly was one, to select a sculptor to execute the statue of the principal figure, which is to represent her in the costume of a peasant. The monument is commissioned to be ready for inauguration by the spring of 1892.——The town of Châteaudun, which distinguished itself by a spirited defence in the Franco-German war, is about to erect a monument in commemoration of the combat of October 18, 1870.—— The death is announced at Bordeaux of the landscape-painter Amédee Baudit, whose works have figured in every salon since 1852.——M. Lambert, the sculptor of the statue of Voltaire in the court of the Mairie of the Ninth Arrondissement at Paris, has offered to the town of Ferney a reproduction in bronze of the work. M. Lambert is the present owner of the château at Ferney in which Voltaire lived.——A French tourist, M. Martel, has made an interesting exploration of the caves of Padirac, near Rocamadour, where he passed twenty-four hours, and discovered eleven lakes or pools, thirty-nine small cascades, and numerous grottoes, besides a great cave or hall 88 mètres high. It is suggested that this be taken in hand and made a "show place" of.——A hatchet of cut flint has been found in the Bois de Boulogne, near the alley of Acacias, apparently of great antiquity. It was found about 5 ft. below the level of the ground, in a layer of flints and sand which formed part of the bed or shore of the Seine in ancient days.

MILAN.—According to the *Courrier de l'Art*, the model of the late Signor Brentano's design for the new façade of Milan Cathedral has been commenced some time back and is now well advanced. According to the original conditions of the competition, the model is to the large scale of $\frac{1}{10}$th of the actual work. It is expected that the model will be exhibited towards the close of the year; but whether or when the actual work will be commenced seems still doubtful.

MISCELLANEOUS.

PARTIAL DESTRUCTION OF THE ALHAMBRA AT GRANADA.—Telegrams from Madrid and Granada state that at about 10 o'clock on Monday night an alarming fire broke out in that part of the Alhambra known as the Patio de Alberça, which is situated close to the famous Patio de los Leones, or Court of the Lions, and the Tocador de la Reina, or Queen's dressing-room. The fire was finally extinguished on Tuesday morning after doing damage which is irreparable, although less extensive than was at first feared. The portion burnt comprises the Sala de la Barca and the right wing of the Arrayanes Court. The remainder of the building was saved. Eight persons were slightly injured. The cause of the outbreak has not yet been ascertained, but suspicions are entertained that it was the work of an incendiary. The judicial authorities have opened an inquiry.

TECHNICAL CLASSES AT GLASGOW.—We have received the prospectus and time-table of day and evening classes in Civil Engineering, Building Construction and Architecture, and Plumbing and Sanitation, to be held during the coming winter months under the auspices of the Glasgow and West of Scotland Technical College, Glasgow. The syllabus appears to be very full and complete, and the fees are moderate. The Lecturers are:—For Civil Engineering, Mr. Arthur W. Thomson, B.Sc., C.E.; for Building Construction and Architecture, Mr. Charles Gourlay, A.R.I.B.A.; for Plumbing, Mr. David Fulton, R.P.C.; and for Sanitation, Mr. Gilbert Thomson, M.A., C.E. The classes will commence early in October, in the Andersonian and Science Arts Buildings, George-street and Bath-street. The courses of study, we are informed by Mr. Gourlay, are those of the Science and Art Department and the City and Guilds of London Institute, but the Honours Class is likely to be specially useful to those who intend to study for the Associate Examination of the Royal Institute of British Architects.

FIREPROOF DOORS.—An interesting proof of the resistance of some simply constructed fireproof doors has been given at Glogau, in Germany, on August 5, during a large fire at one of the military establishments. According to the *Central Blatt der Bauverwaltung*, these doors, of 4 cm. thick pine-wood boarding, sheeted on either side with 3 mm. thick iron plating, resisted the intense heat of the fire for more than three hours, thereby saving a wing of the otherwise gutted building. On examining the doors after the fire, the side of the wood nearest the fire was found charcoaled, whilst the further side still showed its natural light colour.

A PROPOSED NEW LINE OF RAILWAY TO LONDON FROM THE NORTH.—Several provincial journals repeat the statement, noticed by us some little time ago, that the Manchester, Sheffield, and Lincolnshire Railway Company intend next Session to bring in a Bill for a new railway, to give them a direct route from Liverpool and Grimsby, *viâ* Nottingham, Rugby, and Aylesbury, to London. It will run within half a mile of Lutterworth, the inhabitants of which town have long bewailed the fact that through the folly of their ancestors in opposing railways they have hitherto been without direct communication.

"SKY SIGNS."—It is understood that the question of sky signs is to come before the London County Council at the earliest moment. The point will be raised whether erections of this kind, which are virtually a raising of the house, can be placed in position without the consent of the surveyor acting on behalf of the public authorities. If not, it may be taken as settled that "sky signs" will not only be stopped in their growth, but will be greatly reduced. A correspondent suggests that the Advertising Stations (Rating) Act, 1889, Section 4, seems to apply to such signs, and if ordinary hoardings in outside districts are assessed upon rentals of 6d. per yard superficial per month, the rating of these huge structures in the best positions in the City would bring some consolation to the ratepayers, if it does not offer inducement for the discontinuance of the signs.—*Metropolitan*.

STREET IMPROVEMENTS AT WILLESDEN.—Mr. Arnold Taylor, one of the Local Government Board Inspectors, held an inquiry a few days ago at the offices of the Willesden Local Board relative to the application on behalf of that board to borrow 4,623*l.* for works on private streets improvement. From the statements made by Mr. S. Tilley, Clerk to the Board, and Mr. Robson, the Surveyor, it appeared the loan was to make up eight new streets. Last year no fewer than forty new streets were made up. Statistics were given by Mr. Tilley showing that the population of Willesden had risen from 27,397 in 1881 to a present estimated population of 59,000. The development of the neighbourhood was ascribed to the great facilities afforded by the railway and omnibus companies. Mr. Taylor said he had heard that no district in the metropolitan area had developed so rapidly as Willesden. The existing loans were stated to amount to 55,142*l.*

THE PROPOSED VAUXHALL IMPROVEMENT.—At the last meeting of the Lambeth Vestry, a letter was received from the London County Council, intimating that the Council would apply to Parliament in the next session for power to widen the Albert Embankment between Upper Kennington-lane and Vauxhall-walk, provided the Vestry would contribute one-forth of the net cost of the improvement, which was estimated at 26,600*l.*—Mr. Howlett moved that a letter be sent to the Council declining the proposal. The improvement would be of no use unless it was extended to High-street, Vauxhall, and Nine Elms-lane, and it was no use frittering money away on sections of the work. If ever there was a metropolitan improvement this was one.—Mr. White seconded, and maintained that the work should be carried out by the Council.—Mr. Prichard disagreed with the remarks of the previous speakers, and contended that the Vestry would recoup themselves the 6,500*l.* they were asked to contribute by the increased value of the frontages.—The motion was supported by Captain Andrew, Messrs. Ayling, Sharpley, Chambers, and Edwards, and agreed to. We think the Lambeth Vestry will do well to reconsider this decision, on the principle that "half a loaf is better than no bread." There is great need of an improvement at the spot in question. If an instalment of the improvement were carried out, its completion would probably follow in due course.

THE ENGLISH IRON TRADE.—There is greater activity in the English iron market. Consumers, both at home and abroad, appear to recognise the fact that prices are not likely to recede again this year, and are consequently anxious to cover their requirements at present rates, which, according to makers, are still too low to profitably cover the cost of manufacture. In pig-iron there is a decided upward tendency. Scotch warrants have been going up all the week, and Scotch makers' iron is following the lead, as much as 1s. 6d. per ton more being now quoted for some brands. Middlesbrough pig is 9d. per ton dearer, and pig-iron in other districts is advancing. Makers of Bessemer iron have not yet raised their bottom price, but hematite warrants are nearly 2s. dearer. Together with pig-iron, old materials are taking an upward turn. Finished iron and steel are in fairly active request, with prices firm. There is a lull in the tin-plate trade, but makers are very stiff. Shipbuilders have not been booking any fresh orders of consequence this week. Engineers continue actively engaged. —*Iron*.

THE NATIONAL ARMADA MEMORIAL AT PLYMOUTH is to be unveiled during the second week in October by H.R.H. the Duke of Edinburgh.

MR. JAMES HILL, of the firm of James Hill & Co., Queen Victoria-street, has just returned to London, after a ten months' tour round the world.

EXCAVATIONS AT CASTLE CARY.—The excavations at Castle Cary, says the *Western Chronicle*, have been steadily pursued, and now the foundations of the keep of Cary Castle are sufficiently exposed to enable an accurate ground-plan to be made. This plan reveals a state of things that was totally unexpected both by archæologists and the public generally. In the first place, it shows beyond doubt that the castle was not in the position where it was generally supposed to stand, and where its site had been marked on the latest Ordnance map, but about 200 yards to the south-west of it; and it shows that the castle was not an ordinary "shell keep," as described by Clark, but a strongly-built fortress of unusually large dimensions and thickness of walls. The plan of the explorations, as far as they are gone, gives an idea of the size and strength of this stronghold of the Lovels. It represents the outer wall to be 15 ft. in thickness, the foundations of which are of "Cary Hill" stone, and the facings of "Doulting" and "Ham Hill." Careful and accurate plans and sections are being prepared for the purpose of preservation among the records of the Archæological Society at Taunton. But there is still a good deal to be done. The keep is nearly complete, but the walls of the inner and outer baileys are yet to be discovered and put upon the plan.

THE ARCHÆOLOGICAL EXCAVATIONS AT KENILWORTH.—The *Coventry Herald* reports that these excavations are now completed, and that the churchyard has resumed its usual quiet appearance. The nave and north transept of the long-buried church have been cleared, the tiled floor removed, and the surface levelled and turfed over. The removal of the *débris* has given a sharp pitch of about 5 ft. below the level of the adjoining burial-ground; and to meet this difficulty a strongly-built retaining wall has been erected. This answers the double purpose of guarding the nearest row of graves from a landslip, and also gives a pleasing promenade, from which a good view of the excavations may be obtained. The wall extends to the extremity of the north transept, leaving the altar-steps of the Lady Chapel projecting at the foot. The two stone effigies, found during the progress of the work, have been built into the wall. The largest is that of a Canon (headless) in full vestments, and the smaller (also headless) is a grotesque figure of a monk, seated. The pillars, which originally supported the tower, are left *in situ*, and have been pointed up and raised. The flight of steps leading from the church to the cloisters has been preserved, and the space within the cloisters and the outer monastic buildings has been levelled and turfed over, and with the remainder of the excavated area will now be used for burial purposes. The south transept, chancel, and chapter-house are still untouched, and as these portions are on land which is vested in the Local Board there ought to be no difficulties in the way of further research.

A LARGE MONOLITH.—Vinalhaven, Maine, claims to have produced the largest stone ever brought to light. The Bodwell Granite Company recently quarried a shaft of granite which, it is said, is the largest piece of stone ever quarried anywhere, and, if erected, will be the highest, largest, and heaviest single piece of solid stone standing, or that ever stood, so far as any record can be found. In height it considerably exceeds any of the Egyptian obelisks. It is understood, says *Stone*, that the Company quarried this immense monolith on their own account, not having an order for anything of the kind, and they suggest that it would be a fitting contribution from Maine for the monument to be erected in honour of General Grant.

AN AMERICAN TECHNICAL JOURNAL ON "CHINAMANIA."—We hope to be forgiven for lack of reverence for things that are ancient, but we must say that there is a precious lot of old brick gathered together by collectors that has neither merit nor history to commend it, and much of it is absolutely ugly,—that is, it is painful to look at it. There are some old things in ceramics that are good and worth gathering together, but the bulk of it is rubbish that is very much like some of the rubbish that is thrown on the market under the guise of novelty. When it first appears, the price is put high enough to impress a possible purchaser with the idea that it is a meritorious bit of pottery. He buys a piece of the line, say a small vase, for 10 dols., and takes it home to show the innocents of his domicile what a discoverer he is. Six months after he finds a huckster who has picked up the tail end of the "job," and is hawking the selfsame vases on the streets for a quarter. Then he feels real good, like the man in Wall-street a few days ago, who cursed the poor Dago for selling some fancy pottery at rock-bottom prices which correspond precisely with the expensive pieces of the same line that he had bought last winter. There is a happy mean between old rubbish and new rubbish, and that is solid merit of any age or period whatever.—*Crockery Journal of New York*.

ROBERT BROWNING.—The Society of Arts have erected one of their memorial tablets on the house, No. 19, Warwick-crescent, Maida-hill, where Robert Browning lived from the time of his return from Italy, after the death of his wife, in 1861, until the summer of 1887, when he removed to 29, De Vere-gardens.

LEGAL.

DAMAGES AGAINST A STATION-MASTER FOR THE DETENTION OF BUILDING MATERIALS.

In the County of London Sheriff's Court on the 11th inst., before Mr. Under-Sheriff Burchell and a jury, the case of Pilbrow v. Ingham & Sons, Holland, and Mansell was heard. It was an action originally before the High Court, and was remitted for the assessment of damages.

Mr. Overend, the counsel for the plaintiff, stated that his client was a builder at Hounslow, and traded under the style of Taylor & Pilbrow. In June last he ordered a quantity of glazed bricks and pipes from Ingham & Sons, a provincial firm, through Mr. Holland, their representative. The goods were duly forwarded by rail to Hounslow, the plaintiff previously receiving an invoice marked "carriage paid." He sent men and carts to the station to remove the goods, but the station-master refused to deliver them up unless the carriage was paid. The invoice, with the endorsement, was shown to him, but he declined to recognise it, remarking that anyone might have written in the words. The consequence was that the plaintiff was unable to complete work he had in hand, and, besides, his credit was injured by a rumour being circulated in the district that he had bricks at the station, and could not pay the carriage. It was at first supposed that Messrs. Ingham & Sons and Mr. Holland had failed to carry out their contract, but that turned out to be a mistake, and the claim for damages was now made only against Mr. Mansell, the station master.

After a long consultation, the jury gave a verdict for £50 against Mansell.

RECENT PATENTS:

ABSTRACTS OF SPECIFICATIONS.

7,241.—CONSTRUCTION OF WALLS: *J. Wilson.*—According to this invention layers of corrugated metal plates are placed with their respective concavities opposite to each other, so that the double corrugation forms a tube. These spaces are filled with asphalte and a wall thus built up, or sheets of metal are placed a short distance apart and strengthened by pipes or equivalent, and thus a wall is formed. Many modifications for different purposes are described in the specification.

13,158.—VENTILATING SEWERS, &c.: *F. Barnett.*—By this invention, iron, or other pipes of sufficient strength and calibre are fixed with their lowest ends seated in the walls of these sewers, near the crown of their arches, and are brought vertically up the fronts, sides, or backs of houses to about 10 or 15 ft. above the roofs, and fitted with revolving cowl. Short inlet pipes are used, and by reason of the outlet pipes being so much longer the sewer gas is carried off. The action of exhaustion is permanent, like that of a syphon with inverted action.

13,483.—BARS FOR FIRE-GRATES: *R. Peel.*—This patent relates to a new method of attaching the end-pieces of top bars for fire-grates to the top or ornamental plate. This is generally effected by dovetails, but in this improvement lugs or projections are formed on the plate, to which the bars may be secured.

14,997.—LIME-KILNS: *A. Bishop.*—According to this invention a dome is made to the improved kiln, which is circular on plan, and the centre of the dome is provided with a shaft, and round the central shaft smaller feeding shafts are placed. In burning lime by this form of kiln, the fire, being once established, the process is continuous, the chalk being introduced through the central shaft in such a quantity to keep the shaft nearly filled to the top. Fuel is also constantly added in small quantities. As the fuel is consumed and the chalk converted into lime, it passes down the kiln, and is removed at bottom, and the portion of the fuel which is introduced through the small feeding-shafts being deposited near the circumference of the burning mass, the flames from it are drawn onwards towards the centre on their way towards the central shaft, and produce a high temperature with a very moderate amount of fuel.

5,905.—IMPROVEMENT IN JOINERS' SQUARES: *H. D. Marples.*—The blade has an edge graduated as a measure. The wooden part is fitted with a longitudinal and transverse spirit level, and the upper part of the wood arranged as a mitre.

NEW APPLICATIONS FOR PATENTS.

Sept. 1.—13,707, J. Gill, Roofing and Flooring Tiles.—13,737, S. Washington, Connecting Lead Pipes, &c.

Sept. 2.—13,745, G. Willcock, Fastenings for Window-sashes.—13,764, H. Sutcliffe, Lavatory Wash-basins.

Sept. 3.—13,812, S. Hill, Centre Bearings for Swing Windows, Ventilators, &c.—13,822, R. Wilford, Locks and Fastenings for Doors and Casements.—13,860, O. Gardner, Scaffold-fastenings.

Sept. 4.—13,882, J. Salt, Brick-making Machinery, &c.—13,896, J. Bramley, Ventilation.

Sept. 5.—13,957, J. Legge, Door-latches.—13,972, E. Emanuel and others, Supply-valve for Seat-action Water-closets and Water Waste-preventer combined.

Sept. 6.—14,017, P. Walker, Ventilators.—14,038, G. Hovey Hopper, Ventilators for Windows, &c.—14,057, T. Harris, Water-closets.

PROVISIONAL SPECIFICATIONS ACCEPTED.

10,457, T. Bremner, Connecting Cords to Window-sash Frames, &c.—10,611, J. Birch, Fanlight Opener, &c.—10,959, G. Pearson, Securing Tiles or Panels to their Backings.—11,204, H. Lomax and W. Cotton, Fastening Doors, &c.—11,277, J. Merryweather, Cleansing and Disinfecting Drains, &c.—12,011, G. Rohrbach, Gate-hinges.—12,012, G. Rohrbach, Gate-latches.—12,206, E. Bally and E. Wehrli, Parquetry.—12,379, H Mott and J. Perry, Decorative Wall-papers.—12,423, H. Kelsey, Casement Fastener.—12,569, P. Ayton, Bolt-fastener for Casement-windows, &c.—12,655, R. Stanworth, Flushing Tanks.—12,687, G. Chaillet, Folding Step-ladder.—12,721, J. Fryer, Bricks.—12,738, J. Bowing, Portland Cement, &c.—12,781, H. Werner, Concrete Pipes, &c.—13,078, T. Faucett, Brick-making and Pressing Machinery.—13,134, C. Abel, Bricks, &c.—13,155, L. John, Firing Pottery.—13,227, C. Bonne, Cement.—13,282, J. Keikman, Kilns or Ovens for Burning Bricks, Tiles, &c.—13,318, W. Henley and others, Window-sashes, &c.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to Opposition for Two Months.

16,218, M. Rogers, securing Window-sashes in any desired position.—17,443, W. Lindsay, Tiles, and structures in which they are used.—17,666, J. Empson and others, Valves for Cisterns.—17,809, J. Pye, Water-taps.—18,143, H. Nettlefold and J. Sheldon, Screws.—7,294, W. Thompson, Mortising and Boring Machines.—9,465, A. Moore and H. Petts, Sheet Metal Roofing.—11,425, F. Smith, Sash Fastener.—11,446, W. Thompson, Door Bells, &c.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

SEPTEMBER 9.—By *A. G. Thompson & Co.:* 11, Hanover-st., Belgravia, u.t. 34 yrs., g r. 7*l.*, 460*l.*; By *W. H. Keer:* 11, Garlick-hill, City, u.t. 12 yrs., r. 100*l.*, 100*l.*

SEPTEMBER 10.—By *Hampton & Sons:* "Taplow House," Taplow, and 24a. 1r. 33p., f. and c., 17,000*l.*; By *Wyatt & Son* (at Chichester): three f. cottages, Orchard-st., Chichester, r. 29*l.* 18s., 380*l.*; two f. houses, r. 23*l.* 8s., 350*l.*

SEPTEMBER 11.—By *C. C. & T. Moore:* 51 and 57, Willow-st., Westminster, u.t. 54 yrs., g.r. 10*l.* 10s., r. 60*l.*, 515*l.*; 53, Coburg-row, ditto, f., r. 36*l.*, 375*l.*: 52, Rochester-row, ditto, f., 850*l.*; 24 and 26, Collingwood-st., Bethnal-green, c., r. 44*l.* 4s., 370*l.*; 22 and 23, Cotton-gardens, Shoreditch, f., 95*l.*; and 8 and 9, Vine-st., Minories, u.t. 7 yrs., g.r. 65*l.*, r. 172*l.* 18s., 75*l.* By *P. Matthews:* 38, 40, 66 to 72 (even), Warwick-rd., West Ham, u.t. 90 yrs., g.r. 33*l.*, r. 166*l.* 6s., 1,020*l.*; three houses, Sydney-rd., Hornsey, u.t. 93 yrs., g.r. 18*l.* 8s., r. 80*l.*, 705*l.*; "Gayton House," Gayton-rd., Harrow, f., r. 100*l.*, 1,650*l.*; 17 and 19, Handen-rd., Lee, u.t. 77 yrs., g.r. 4*l.*, r. 82*l.*, 1,200*l.*; 13, 14, and 15, South-rd., Erith, u.t. 58 yrs., g.r. 12*l.*, r. 60*l.*, 660*l.*; the f. house, "Ormiston," Leaney Park-rd., Erith, r. 60*l.*, 1,000*l.*

[*Contractions used in these lists.*—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; e.r. for estimated rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; yd. for yard, &c.]

PRICES CURRENT OF MATERIALS.

TIMBER.	£.	s.	d.	£.	s.	d.
Greenheart, B.G. ....ton	6	10	0	7	5	0
Teak, E.I. ....load	10	0	0	13	0	0
Sequoia, U.S. ....foot cube	0	2	8	0	3	0
Ash, Canada ....load	2	10	0	4	5	0
Birch "	2	5	0	4	5	0
Elm "	3	10	0	4	15	0
Fir, Dantsic, &c.	2	0	0	3	15	0
Oak "	2	10	0	4	10	0
Canada	5	0	0	6	10	0
Pine, Canada red	2	10	0	3	10	0
" yellow	2	0	0	5	10	0
Lath, Dantsic ....fathom	5	0	0	6	0	0
St. Petersburg	5	0	0	7	0	0
Deals, Finland, 2nd & 1st. std. 100	7	15	0	10	0	0
" " 4th and 3rd	7	0	0	7	10	0
Riga	6	0	0	8	10	0
St. Petersburg, 1st yellow	9	10	0	14	10	0
" 2nd "	7	10	0	9	0	0
" white	7	0	0	10	0	0
Swedish	7	0	0	15	0	0
White Sea	8	0	0	17	0	0
Canada, Pine, 1st	13	0	0	24	0	0
" " 2nd	9	0	0	16	0	0
" " 3rd, &c.	7	0	0	10	0	0
" Spruce, 1st	8	10	0	10	10	0
" " 3rd and 2nd ..	6	10	0	8	0	0
New Brunswick, &c.	5	10	0	7	10	0
Battens, all kinds	4	10	0	15	10	0
Flooring Boards, sq., 1 in., prepared, First	0	10	0	0	14	0
Second	0	8	0	0	10	6
Other qualities	0	6	0	0	7	9
Cedar, Cuba ....foot	0	0	3½	0	0	4
Honduras, &c.	0	0	3½	0	0	4½
Mahogany, Cuba	0	0	4½	0	0	6½
St. Domingo, cargo average ..	0	0	4½	0	0	6½
Mexican "	0	0	4½	0	0	5½
Tobasco "	0	0	5½	0	0	6½
Honduras "	0	0	5½	0	0	6½
Box, Turkey ....ton	4	0	0	13	0	0
Rose, Rio	13	0	0	19	0	0
Bahia	12	0	0	18	0	0
Satin, St. Domingo ....foot	0	0	9	0	1	3
Porto Rico	0	0	10	0	1	6
Walnut, Italian	0	0	4	0	0	7

METALS.						
IRON—Bar, Welsh, in London tn	6	10	0	6	17	6
" " at works in Wales	6	0	0	6	10	0
" Staffordshire, in London..	7	0	0	8	0	0
COPPER—British, cake and ingot	65	0	0	65	10	0
Best selected	67	0	0	68	0	0
Sheets, strong	73	0	0	74	0	0
Chili, bars	61	10	0	0	0	0
YELLOW METAL ....lb.	0	0	6½	0	0	6½
LEAD—Pig, Spanish ....ton	13	13	9	0	0	0
English, com. brands	0	0	0	0	0	0
Sheet, English, 3 lbs. per square foot and upwards....	15	0	0	0	0	0
Pipe	15	10	0	0	0	0
ZINC—English sheet ....ton	25	10	0	26	0	0
TIN—Straits	99	0	0	0	0	0
Australian	99	0	0	0	0	0
English Ingots	102	0	0	0	0	0

OILS.						
Linseed ....ton	24	10	0	24	15	0
Cocoanut, Cochin	33	10	0	34	0	0
" Ceylon	32	10	0	0	0	0
Palm, Lago	29	0	0	0	0	0

OILS *(continued).*	£.	s.	d.	£.	s.	d.
Rapeseed, English pale	31	0	0	0	0	0
" brown	29	10	0	0	0	0
Cottonseed, refined	21	10	0	0	0	0
Tallow and Oleine	21	0	0	40	0	0
Lubricating, U.S.	5	10	0	6	0	0
" refined	7	0	0	12	0	0
TAR—Stockholm ....barrel	1	0	6	0	0	0
Archangel	0	15	0	0	0	0

TENDERS.

[Communications for insertion under this heading must reach us *not later than* 12 *noon on Thursdays.*]

ARKLEY (near High Barnet).—For alterations to Eastwood, for Mrs. Barnes. Mr. Hubert A. Gregg, architect, 1a, St. Helen's-place, E.C.:—

James, Barnet (accepted)	£330 0 0

ARKLEY (near High Barnet).—For rebuilding the vicarage for Mrs. Barnes. Mr. Hubert A. Gregg, architect, 1a, St. Helen's-place, E.C.:—

James, Barnet (accepted)	£850 0 0

BEDDINGTON (Surrey).—For first portion of new flour mill, at Beddington, Surrey, for Messrs. J. & T. H. Wallis. Mr. Horace T. Bonner, architect, 29, King-street, Cheapside, E.C. Quantities supplied:—

Chappell	£2,200 0 0
Jerrard	1,925 0 0
Spencer & Co.	1,920 0 0
Holloway	1,900 0 0
Page	1,896 0 0
Humphries	1,810 0 0
Smith & Son	1,793 0 0
Taylor	1,762 0 0
Trappitt, Beddington (accepted) ..	1,700 0 0

BELFAST.—For works on the Antrim-road, Belfast. Mr. John H. Brett, County Surveyor, County Courthouse, Crumlin-road, Belfast:—

John Smith, York-road, Belfast*	£1,500 0 0
Gregg & Gaston	1,498 19 0

* Accepted.

BLACKWOOD (Mon).—For the erection of a new English Baptist Chapel at Blackwood, Mon. Mr. W. L. Griffiths, architect, 68, High-street, Newport, Mon.:—

H. Welsh	£1,550 0 0
J. Linton	1,400 0 0
T. Lawrence	1,350 0 0
Hughes & Pugh	1,345 12 6
Morris & Thomas	1,285 0 0
John Hardy, Blackwood (accepted)	1,092 0 0

BRAY (Ireland).—For the erection of stabling, &c., at Bray, Ireland, for the Bray Township Commissioners. Mr. F. Comber, Township Surveyor, 8, Anglesea-street, Dublin:—

Henry Pemberton	£679 0 0
Robert O'Connor	449 4 0
Bernard Brady & Sons, Bray*	396 8 4

* Accepted.

BRIMSDOWN (Middlesex).—For the erection of four cottages on the Brimsdown Estate, for Mr. Godfrey A. Baker. Mr. G. Warren Cooper, Bedford Row House, Bedford-row, W.C., architect:—

C. J. Brice, Beckenham (accepted)..	£760 0 0

BRIMSDOWN (Middlesex).—For the erection of fourteen Cottages on the Brimsdown Estate, for Mr. Godfrey A. Baker. Mr. G. Warren Cooper, Bedford Row House, Bedford-row, W.C., architect. No quantities:—

F. Voller, Wood Green	£3,988 0 0
S. Goodall, Stoke Newington (accepted)	2,980 0 0

BURNOPFIELD (Co. Durham).—For additions to co-operative store at Burnopfield, co. Durham, for the Burnopfield District Co-operative Society. Mr. J. Wm. Rounthwaite, architect, Blackhill, Co. Durham:—

Whole Tenders.

H. Brown & Co., Newcastle-on-Tyne	£700 0 0
R. Mitchison & Co., Newcastle-on-Tyne	400 0 0

Mason, Plasterer, Slater, and Plumber.

A. & R. Davis, Burnopfield*	278 8 6

Joiner and Painter and Glazier.

John Scott, Burnopfield*	176 14 7

Total of accepted tenders £455 3 1

[A number of other separate tenders were received.]

* Accepted.

CADOXTON (South Wales).—For the execution, completion, and maintenance of works required in the construction of two roads at Cadoxton, South Wales, for the Barry and Cadoxton Local Board. Mr. J. C. Pardoe, Surveyor, Local Board Offices, Cadoxton:—

Widening and Improving Holton and Weston-road.—Contract No. 1.

W. R. Parker & Co.	£5,355 14 0
Alfred Elliott	4,812 16 11
T. Jones Davies	3,800 0 0
E. J. Ince	3,760 18 3
David Love, Cadoxton (accepted)..	3,515 2 0

Road from Court-road to Police Station.—Contract No 2.

Alfred Elliott	1,975 9 10
W. R. Parker & Co.	1,817 2 0
Jenkin Brock	1,616 6 3
T. Jones Davies	1,579 19 2
E. J. Ince	1,487 4 5½
David Love, Cadoxton*	1,335 14 4

* Accepted, conditionally.

CROYDON.—For the completion of "Oxford and Cambridge houses," Birdhurst-rise, South Croydon, for Mr. F. A. A. Rowland. Mr. E. C. Homer, architect, 99, Gresham-street, E.C.:—

Staines & Son	£1,296 0 0
Kelland	1,235 0 0
Smith & Son	1,175 0 0
Saunders	1,168 0 0
Chessum & Sons	1,100 0 0
Ellis & Turner	1,100 0 0
Batley & Linfoot (accepted)	997 0 0

CONTRACTS AND PUBLIC APPOINTMENTS.

CONTRACTS.

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.
*Public Baths and Washhouses	Stockton-on-Tees Corp.	K. F. Campbell	Sept. 20
Guernsey Granite Road-metal (1,000 tons)	Woolwich Local Board	H. D. Thomas	Sept. 23
Alterations to Property, Elgin		A. & W. Reid	do.
Main Drainage Works (three contracts)	Borough of Hanley	Jos. Lobley	do.
Sewerage and Road Works	Laddenden Foot (Manchester) Local Board		
Metalling, Paving, &c.	Altrincham Local Bd.	Henry Barber	do.
Re-flooring, &c. Market-house	do.	Jno. Stokoe	do.
*Supply of Forage	Tottenham Local Bd.	do.	do.
*Supply of Granite Spalls	West Ham Union	do.	do.
*Supply of Wood	do.	Official	Sept. 24
Baths and Fittings	Gateshead Baths Com.	do.	do.
Reservoir, Pumping Station, Laying Water Mains, &c.		J. Bower	do.
Heating Apparatus at Workhouse	Tuam Union	Chris. Mulvanny	do.
Cast-iron Stanchions, Brackets, &c.	Salford Union	Official	Sept. 25
	Indian Mid. Ry. Co. Lim.	do.	do.
Re-erection of Cabinet Works, Halifax	do.	Jas. Farrar	do.
Enlarging Water-dam, Darnhall, near Winsford	Northwich Local Bd.	Henry Bancroft	do.
*Pipe Sewer	Clerkenwell Vestry	W. Iron	do.
*New Tiled Roof, &c. Spital-street, E.	Acme Box & Packing Case Co.	do.	do.
*Granite Kerb	Twickenham Loc. Bd.	Official	do.
Forty-two Coke Ovens	Sacriston Colliery, Durham	do.	Sept. 26
*Finishing and Fitting-up Premises	London & Subur. Co-operative Stores, Lim.	Jno. Waldram	do.
Street Improvement Works	Penarth Local Board	Official	Sept. 27
*Three Residences, Ebyl		E. E. Hughes	Sept. 29
*Storm Relief Sewer, Mare-street, Hackney	LondonCountyCouncil	Official	do.
*Lime Store, Machinery, &c. Barking Sewage Works	do.	do.	do.
Sewering and Road Works	Withington Local Bd.	A. H. Mountain	do.
Number Plates (1,700) for Telegraph Posts	Bengal & N. W. Ry. Co. Lim.	Official	do.
Quantity of Station Name Boards, Mile-Posts, &c.	Nizam's State Ry. Co. Lim.	do.	Sept. 30
House and Shop, Elgin		Chas. C. Doig	do.
Supply of Gravel (750 yds.)	New Malden Loc. Bd.	Official	do.
Alterations to Police Station	Hertford Corporation	do.	do.
Additions, &c. to Mansion, nr. Llandyssil	Col. W. Ll. Lewes	D. Jenkins	do.
Parsonage House, Ystradffin, Llandovery	Rev. E. Morgan	do.	do.
*New Passenger Station, North Stockton	N. E. R. Co.	W. Bell	Oct. 1
* do. do. (ironfounder's Wrk)	do.	do.	do.
Wrought-iron Roof for Swimming Baths	Southampton Corp.	W. B. G. Bennett	do.
*Erection of Public Baths, E. Dulwich-rd.	Camberwell P. B. & W. Commrs.	Spalding & Cross	do.
*Road Materials	Greenwich Bd. of Wks	Official	do.

CONTRACTS.—*Continued.*

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.
New Porch and Completion of Church, Atherton, near Manchester		Paley, Austin, & Paley	Oct. 2
*Pipe Sewers, &c.	Barnet Local Board	W. H. Mansebridge	do.
*Making-up Roads and Paving Crossings	Friern Barnet Loc. Bd.	G. Clarke	Oct. 3
*Making-up Road	Wanstead Local Board	Official	do.
*Broken Granite	Romford Local Board	do.	Oct. 4
*New Street Works	Hendon U.R.S.A.	T. Henry	Oct. 6
Steam Crane, &c. (150 tons)	Clyde Navigation Trus.	Jas. Deas	do.
Additions to Board School	Redwellty (Tredegar) Sch. Bd.	Official	do.
New Hospital	Billericay U.R.S.A.	do.	do.
Villa and Cottage, Cross Keys, Mon.	Jas. Cox	A. T. G. Woods	do.
Wrought-iron Water Tank, Hammersmith Station	Hammersmith & City Railway	A. D. Edwards	Oct. 7
*Roadmaking Works	Windsor R.S.A.	Official	do.
*Extension of Main Sewer	Brentford Local Board	W. Menzies	do.
Public Baths	Borough of Salford	J. H. Strachan	do.
*Erection of School	Swindon School Board	Maginnall & Littlewood	Oct. 8
*Machinery for Sewage Disposal Works	Teddington Local Bd.	B. Binyon	Oct. 13
Supply of Timber	The Admiralty	Official	do.
Water Supply Materials, New Westminster, British Columbia	.....	do.	Oct. 15
Dry Fence Wall (4 miles) South Witham, Grantham	.....	Arthur Hill	Oct. 20.
Concrete Retaining Wall, Scotswood-on-Tyne	.....	Mr. Nowell	No date
Enlargement of Wesleyan Chapel, Ashington, Morpeth	.....	.....	do.
Pulling-down and Re-building House, Southampton	.....	W. J. Charlton	do.
Repairs, &c. to House and Shop, Stamford	.....	A. W. Galbraith	do.
Driving Drift (100 yds.), Hoyland, near Barnsley	H. Carew Cox	.....	do.
*New Stands and Offices on Gatwick Race Course	Hoyland Coal & Coke Co.	.....	do.
*Construction of Buildings, World's Labour Exhibition, London	Messrs. Verrall & Co.	Holland & Son	do.
*Roofing of do. do. do.	.....	.....	do.
*Superstructure of New Offices, Leeds	.....	.....	do.
	Prudential Assur. Co.	A. Waterhouse	do.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary	Applications to be in
*Surveyor's Accountant	Hastings Town Coun.	2l. 2s.	Sept. 22
*Surveyor's Accountant	Bournemouth Comrs.	104l.	Sept. 30

Those marked with an Asterisk (*) are advertised in this Number. Contracts, pp iv., vi., *and* viii. *Public Appointments, p.* xviii.

DONCASTER.—For erecting Primitive Methodist chapel, school-room, and residence, at Hyde-park, Doncaster. Mr. J. Simmons, architect (Brundell, Simmons, & Brundell), 1, Princes-street, Doncaster:—

Mullins & Richardson	£1,395 0 0
J. C. Wombell	1,200 0 0
F. Beastall	1,193 0 0
B. Wortley	1,095 0 0
C. Sprakes & Son, Doncaster*	1,093 0 0
R. Hopkins	1,085 6 8

* Accepted.

EASTLEIGH (Hants.).—For the erection of a shop and residence at Eastleigh, near Southampton, for Mr. J. J. Budd. Mr. Thos. Stopher, architect and surveyor, 57, High-street, Winchester:—

F. Savage	£1,688 3 0
C. A. Hutchings	1 350 0 0
W. Shearman	1,300 0 0
J. Nicola	1,290 0 0
W. Franklin	1,248 0 0
Morgan, Isted, & Morgan	1,190 0 0
E. W. Stagg	1,180 0 0
Crook & Son, Southampton*	1,173 0 0

* Accepted.

FAREHAM.—For works of tar paving in footpaths, in the District of Fareham, for the Local Board. Mr. Walter Butler, Surveyor:—

	s.	d.	
Brunswick Paving Co.	2	9	per yard super.
E. Bradshaw	2	3	,, ,,
J. Plummer	2	3	,, ,,
W. H. Wheeler	2	0	,, ,,
Asphaltic Concrete Co.	2	0	,, ,,
Wm. Fulford's Executors	2	0	,, ,,

FOLESHILL (near Coventry).—For the erection of new Liberal Club, at Lockhurst-lane, Foleshill, near Coventry, for the Foleshill Co-operative Land and Building Society, Limited. Mr. Amos Randle, architect, 21, Broadgate, Coventry:—

Chas. Garlick	£680 0 0
Thos. Wright	577 8 5
Kelley & Son	549 0 0
Heatherley Bros.	475 0 0
David Clarke, Paradise, Foleshill*	475 0 0

* Accepted.

GREENWICH. — For alterations at the "Loyal Briton," Horseferry-road, Greenwich, S.E., for Mrs. Brookes. Mr. H. T. Bonner, architect, 29, King-street, Cheapside, E.C.:—

H. Bridel, Greenwich (accepted) £310 0 0

KENDAL. — Accepted for building three houses at Kendal, for Mr. Herbert Moser. Mr. John Stalker, architect, Kendal:—

For Excavating, Walling, Masons' Work, and Slating.—J. W. Howie, Kendal.

For Carpenter and Joiners' Work.—W. Hutchinson, Kendal.

For Plumbing, Gas, and Water Fitting.—E. Hubbard, Kendal.

For Glazing and Painting.—W. Jackson, Kendal.

For Plastering.—B. Davis, Kendal.

[Total amount of accepted tenders, £650.]

KENLEY (Surrey).—For additions at Hayes Court, Kenley, Surrey, for Mr. P. Castle Smith:—

Robert Eddie £650 0 0

LLANHILLETH (near Newport, Mon.).—For the erection of cottages for the Llanhilleth Cottage Building Co., Limited. Mr. W. L. Griffiths, architect, 68, High-street, Newport, Mon.:—

Charles Locke	£130	0	0	per house.
Moulton & Brownscombe	128	0	0	,,
Morris & Thomas	125	0	0	,,
Hughes & Pugh, Newport*	120	0	0	,,

* Accepted.

LEEDS.—For the erection of thirteen houses at Linden-grove, Dewsbury-road, Leeds, for the Leeds Industrial Co-operative Society (Limited). Mr. W. S. Braithwaite, architect, 6, South Parade, Leeds:—

Accepted tenders.

Thos. Hannam, Leeds, *Brick and Stone.*
Stead & Noble, Leeds, *Plumber and Glaziers work.*
J. W. Richmond, Leeds, *Slating.*
A. Marsden, Beeston Hill, *Plasterer.*
Carter & Frankland, Woodhouse, *Painters.*
Total estimates, £3,300.

[The Co-operative Society will do the joiners' work themselves.]

LONDON.—For erecting proposed factory and warehouse in Lever-street, St. Luke's, E.C., for Mr. F. T. Pullivant. Mr. A. Allen, jun., architect, 12, City-road:—

Williams & Richards	£4,864 16 10
Mowlem	4,810 0 0
Marsland	4,779 0 0
Ansell	4,641 0 0
Grover	4,639 0 0
Wall	4,566 13 2
Brass	4,561 0 0
Archer	4,500 0 0
Lawrence	4,375 0 0
Downs	4,346 0 0
Patman & Fotheringham	4,283 0 0
Sabey	4,228 0 0
Kellaway	4,141 0 0
Dearing & Son	4,135 0 0

LONDON.—For the erection of stabling and residential chambers, Elgin-avenue, St. Peter's Park, W., for Messrs. Welford & Sons, Limited. Mr. Edward Vigers, architect, 38, Parliament-street, Westminster. Quantities by Messrs. Fowler & Hugman, Craig's-court, Charing Cross:—

	Carcase.	Completion.	
Foster & Dicksee	£5,299	£2,699	£7,898
Martin, Wells, & Co.	4,955	2,450	7,405
Waterman, Watford	5,130	2,345	7,395
Thos. L. Green	4,793	2,354	7,147
Treasure & Sons	4,870	2,276	7,146
Colls & Sons	4,617	2,354	6,971
Kirk & Randall	4,711	2,336	6,950
Perry & Co.	4,679	2,225	6,904
Thos. Gregory & Co.	4,630	2,257	6,887
Nightingale	4,587	2,238	6,825
Thos. J. Messom	4,247	2,447	6,694
William Downs	4,555	2,115	6,670

LONDON.—For repairs to No. 19, Myddleton-square, Clerkenwell, E.C., for Mr. James D. Spires. Mr. H. I. Newton, architect, 49, Victoria-street, Westminster, S.W.:—

F. Mark	£793 0 0
Hebb	695 0 0
W. H. Becton	498 10 6
F. Dainton	485 0 0
S. R. Lamble, Kentish Town*	467 0 0

* Accepted.

LONDON.—For alterations and additions to the Liberal and Radical Club, Globe-rd., Mile-end, E. Mr. W. Perry, architect, Bow. Quantities not supplied:—

Geo. Barker	£799 0 0
S. Lissner	675 0 0
J. W. Neale	657 0 0
Pitman & Son	566 0 0

LONDON.—For fitting up shop at 184, High-street, Deptford. Mr. Robert Willey, architect:—

Williams	£375 0 0
Holliday & Greenwood	343 0 0
Curtis	290 0 0
W. Vanstone	290 0 0
Kellaway	285 0 0

LONDON.—For pulling-down and rebuilding No. 47, Great Portland-street, W., for Mr. W. H. France. Mr. Albert E. Pridmore, architect, 2, Broad-street-buildings, E.C.:—

Louis F. Lundy (accepted) £926 0 0
[No competition.]

LONDON.—For works at the "Royal Standard" public-house, Fleming-street, Kingsland-road. Mr. Harvey Dyball, architect:—

Robert Eddie £978 0 0

LONDON.—For works at the "United States" public-house, Commercial-road, E. Mr. Harvey Dyball, architect:—

Robert Eddie £401 0 0

LONDON.—Accepted for internal fittings at the "Adelphi Stores," Strand. Messrs. Wylson & Long, architects:—

Robert Eddie £281 0 0

LONDON.—For works at 125, Cobourg-road, Old Kent-road. Mr. Harvey Dyball, architect:—

Blake	£198 10 0
Robt. Eddie	176 0 0

MARKET BOSWORTH.—For the construction of about 746 yards of 9, 12, and 15-in. earthenware and cast-iron socketed pipe sewers, with man-holes, &c., complete, in the parish of Ratby, for the Market Bosworth Rural Sanitary Authority. Mr. G. S. Horton, Surveyor, Market Bosworth:—

Moreton	£450 0 0
J. Palmer, Ibstock, Ashby-de-la-Zouch (accepted)	408 10 0

MITCHAM.—For the erection of fire-escape staircases at their Schools, Mitcham, Surrey, for the Guardians of the Poor of the Holborn Union. Mr. H. Saxon Snell, architect, London:—

Lorden & Son	£839 0 0
Flew & Co.	798 0 0
T. Nye, Ealing	797 0 0
J. O. Richardson, Peckham (accepted)	658 0 0

MORDEN (Surrey).—For providing and fixing about 400 yards lineal of oak park fencing, on the Hobald's Farm Estate, Morden, Surrey, for the Battersea Burial Board:—

Jos. Yates	£233 10 0
Jno. King	227 19 0
Jno. Wood	205 0 0
H. Knight	204 0 0
Stennings	198 0 0
Astell Bros.	195 0 0
Hy. Marshall	195 0 0
Rowlands Bros.	195 0 0
Waterman	194 15 0
Jas. Longley (accepted)	178 0 0

MOUNTAIN ASH (Glamorganshire).—For building a school-room adjoining the Welsh Calvinistic Methodist Chapel at Mountain Ash, for the Rev. M. D. Jones:—

John Morgan	£376 0 0
Thomas Davies, Mountain Ash*	310 10 0

* Accepted.

NELSON (Glamorganshire).—For the erection of thirty houses at Nelson, near Treharris, Glamorganshire, for the Nelson Building Club. Mr. W. L. Griffiths, architect and surveyor, Newport, Mon.:—

John Linton	£6,233 0 0
Charles Lock	5,280 0 0
Morris & Thomas	5,000 0 0
W. A. Linton	4,700 0 0
Hughes & Pugh	4,350 0 0
T. Rees	3,900 0 0
J. E. Davies	3,950 0 0
E. Edwards, Nelson (accepted)	3,890 0 0

NEWCASTLE-ON-TYNE (near).—For leading and laying 5,800 yards of cast-iron pipes and connexions between Atkinson-road, Benwell, and Newburn, Northumberland, for the Newcastle and Gateshead Water Company. Mr. J. R. Forster, engineer, Newcastle and Gateshead Water Company, Newcastle-on-Tyne:—

John T. Simpson	£4,203 0 0
Nicholson & Elliott	2,765 10 0
Smith & Gibbon	2,677 10 0
John & Thomas Young	2,651 10 0
Thomas Bell	2,351 6 0
William Carr, Hexham (accepted)	2,335 12 6
Gustavus Bailey	2,216 10 0

NEW MALDEN.—For the erection of Baptist Chapel, Kingston-road. Mr. W. H. Woodroffe, architect, 214, Great Dover-street, S.E.:—

Roffey	£2,050 0 0
Smith & Son	1,998 0 0
Parker	1,943 0 0
Hards	1,838 0 0
Young & Lonsdale	1,764 0 0

PONTYPRIDD.—For building a workmen's institute and public hall at Ynyshir, near Pontypridd, for the Ynyshir and Wattatown Public Hall Company (Limited). Mr. Charles Taylor, architect, 22, Duke-street, Cardiff:—

Johnson Bros.	£5,887 10 0
Joseph Thomas	5,572 0 0
Exors. of W. Gradwell	4,670 0 0
C. Jenkins & Son, Porth*	4,600 0 0

* Under consideration.

PONTYPRIDD.—For the erection of twenty-two workmen's cottages at Ynysybwl, near Pontypridd, for the Ynysybwl Building Society. Mr. John Bevan, architect, Mountain Ash:—

Edward Evans, Ynysybwl, near Pontypridd (accepted)	£3,150 10 0

[Five tenders were received, the highest of which was £3,850 total.]

POTTERS BAR.—For the erection of a new police-station at Potters Bar, for the Receiver for the Metropolitan Police District. Mr. John Butler, architect. Quantities by Mr. W. H. Thurgood:—

C. Barnes	£1,907 0 0
Patman & Fotheringham	1,903 0 0
Hart Bros.	1,900 0 0
J. Smith & Sons	1,897 0 0
Higgs & Hill	1,894 0 0
J. T. Chappell	1,893 0 0
Grover & Son	1,889 0 0
Scrivener & Co.	1,877 0 0
Nightingale	1,852 0 0
Lathey Bros.	1,850 0 0
Willmott & Sons	1,785 0 0

SHEFFIELD.—For the erection of lodge at Carbrook Recreation Grounds, Sheffield. Mr. Charles F. Wike, Borough Surveyor:—

Dutton & Evans	£563 0 0
John Eshelby	545 0 0
John Morton	493 3 0
W. L. Smith	491 0 0
T. Cuthbert	467 0 0
J. Chambers & Sons	464 0 0
J. Mastin & Sons, Sheffield (accepted)	453 0 0

SHEFFIELD.—For painting work at Lodge Moor Fever Hospital, Sheffield, for the Corporation of Sheffield. Mr. C. F. Wike, Borough Surveyor:—

Wm. Fuller	£210 0 0
M. A. Topham	200 0 0
G. Smith	197 3 0
A. Jubb	195 15 0
M. H. Thraves	188 19 8
A. Machin	170 0 0
F. Jackells	168 17 0
J. Puttrell & Co.	155 0 0
Smith & Snape	150 0 0

SHEPTON MALLET.—For the erection of a minister's house at Shepton Mallet, for the trustees of the Centenary House. Mr. J. Ace Beynon, architect, Coleford, near Bath:—

Contract A.

Ford	£920 0 0
T. Ashman	854 0 0
Jones	760 0 0
T. James, jun.	735 0 0
W. Tovey	729 1 5
Doddimead	711 10 0
J. H. Pullen (accepted)	659 14 0

Contract B, Boundary-walls, Entrance-gates, &c.

Pullen (accepted)	£60 0 0

STAFFORD.—For excavating, paving, kerbing, channelling, &c., roads at Stafford, for the Corporation. Mr. W. Blackshaw, Borough Surveyor, Stafford:—

	Kerb and channel.	Blue brick paving.
J. Frayne	£447 4 10	
Bradshaw & Co.	323 1 11	£918 8 6
Burnham & Phillips	492 0 6	
W. Moore	479 9 5	
H. Newton	507 18 5	621 5 9
C. J. Nevitt, Stafford*	404 11 2	567 5 3

* Accepted.

SURBITON.—For alterations and additions to "Saxonbury," St. Mary's-road, Surbiton, for Mr. J. E. Bowring. Mr. William Wallace, architect, 27A, Old Bond-street. Quantities by Mr. Walter Herring:—

Jarvis	£3,714 0 0
Fox & Co.	3,676 0 0
Faulkner	3,663 0 0
Havell	3,458 0 0
Gregory & Co.	3,357 0 0
Marriage	3,203 0 0

WALTHAMSTOW.—For building new class-room and teachers' rooms at the Samuel-road Girls' and Infants' Schools, for the Walthamstow School Board. Mr. W. A. Longmore, architect, 7, Great Alie-street:—

Barrett & Power	£635 0 0
Fuller	585 0 0
Challis	585 0 0
Taylor	540 0 0
Cracknell, Walthamstow (accepted)	485 0 0

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